LevelOne

WAP-0006/0009

11g Wireless AP

User Manual

V1.0-0609

Chapter 1 Introduction

LevelOne WAP-0006/0009 is an access point for IEEE 802.11g/b 2.4GHz wireless network. User can use this access point to build up a wireless LAN. Any wireless LAN station can join the wireless network by using the “Infrastructure Mode”.

The product supports WEP, WPA, WPA2, ESSID and MAC address filter functions to consolidate the wireless network security. With ESSID authentication, WPA2 encryption and MAC address filtering user can prevent unauthorized wireless stations from accessing user’s wireless network.

The product’s dipole antenna is detachable by connecting to a RP-SMA connector. Users can install a high gain antenna to the connector for better network link quality so that user can build wireless network with more flexibility.

This product provides easy to use user interface and allows users to configuring from web browser. Also it integrates DHCP server to provide multiple wireless and wired users to get their IP address automatically.

With the versatile of features, this product is the best choice for user to integrate user’s wireless and wired network seamlessly.

1.1 Package Contents

The Access Point includes the following items:

- WAP-0006/0009
- Power Adapter (WAP-0006 Only)
- Dipole Antenna
- CD Manual
- Quick Installation Guide

1.2 Features

- Complies with the IEEE 802.11b/g (DSSS) 2.4GHz specification.
- Compliant with IEEE802.3af POE PD(Power Device) standard (WAP-0009 Only)
- High data rate 54Mbps network speed.
- Seamlessly integrate wireless and wired Ethernet LAN networks.
- Auto rate fallback in case of obstacles or interferences.
- Provide 64/128-bit WEP and WPA Data Encryption function to protect the wireless data transmissions.
- Built-in DHCP server supports auto IP addresses assignment.
- Supports Web-based configuration.

1.3 Specifications

- Standards: IEEE 802.11b/g (Wireless), IEEE 802.3 (Wired)
- Data Rate: 54/48/36/24/18/12/11/9/6/5.5/2/1Mbps auto fallback
- Security Encryption: 64/128-bit WEP/
  WPA(802.1x, TKIP)
  WPA2(AES)
- Frequency Band: 2.400~2.4835GHz (Industrial Scientific Medical Band)
- Modulation: CCK@11/5.5Mbps, DQPSK@2Mbps and DBPSK@1Mbps
- Radio Technology: Direct Sequence Spread Spectrum (DSSS)
- Antenna: External detachable dipole antenna (with RP-SMA connector)
- Connectors: 10/100Mbps RJ-45 x 1

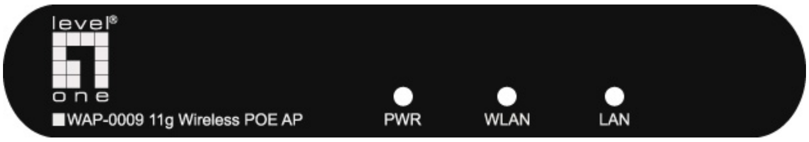
- Power: 12VDC, 0.5A
- Transmit Power: 15dBm (Typical)
- LEDs: Power, LAN Link/Activity, Wireless Activity
- Dimension: 30(H) x 127(W) x 96(D) mm
- Temperature:

  Operating: 32~131°F (0~55°C)
  Storage: -4~158°F(-20~70°C)
- Humidity: 10-90% (Noncondensing)
- Certification: FCC, CE

1.4 Physical Description

Front Panel

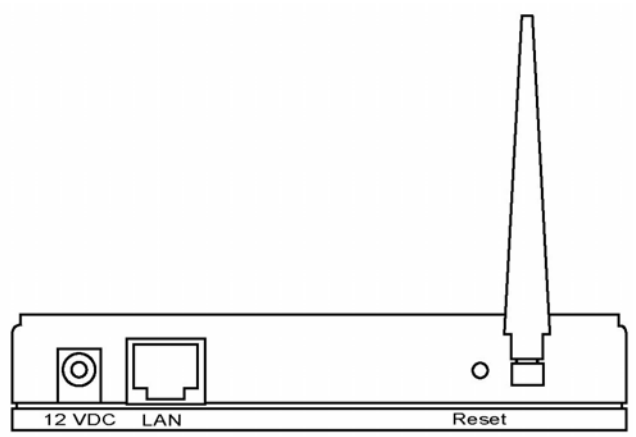
On the Access Point's front panel there are LED lights that inform user of the Access Point's current status. Below is an explanation of each LED.



LED	Color	Status	Description
Power	Green	Lit Off	Power is supplied. No Power.
Wireless Activity	Green	Flash Off	Antenna is transmitting or receiving data. Antenna is not transmitting or receiving data.
LAN Link/Activity	Green	On Flash Off	A valid link is established. It is transmitting or receiving data. No link is established.

Back Panel

Access Point’s connection ports are located on the back panel. Below is the description of each connection port.



- Antenna Connector
  This round connection is standard Reverse SMA connector where any antennas with Reverse SMA connector can connect to the Access Point.

- DC Adapter Port
  Insert the power jack of the power adapter into this port.

- LAN Port
  The Access Point’s LAN port is where user connects to user’s LAN’s network devices.

- Reset
  The Reset button allows user to do one of two things.

  1) If problems occur with user’s Access Point, press the reset button with a pencil tip (for less than 4 seconds) and the Access Point will re-boot itself, keeping user’s original configurations.

  2) If problems persist or user experience extreme problems or user forgot user’s password, press the reset button for longer than 4 seconds and the Access Point will reset itself to the factory default settings (warning: user’s original configurations will be replaced with the factory default settings).

Chapter 2 Hardware Installation

1. **Locate an optimum location for the Wireless LAN Access Point.**
   The best location for user's Access Point is usually at the center of user's wireless network, with line of sight to all of user's mobile stations.

2. **Connect the Wireless LAN Access Point to user's router, hub or switch.**
   Connect one end of standard UTP cable to the Access Point's LAN Port and connect the other end of the cable to a switch, a router or a hub. The Access Point will then be connected to user's existed wired LAN Network.

3. **Connect the DC Power Adapter to the Wireless LAN Access Point's Power Socket. (WAP-0006)**
   Only use the power adapter supplied with the Access Point. Using a different adapter may damage the product.

4. **Connect the Wireless LAN Access Point to your POE adapter, router, hub or switch. (WAP-0009 Only)**
   Connect one end of standard UTP cable to the Access Point's LAN Port and connect the other end of the cable to a **powered** Ethernet port on POE switch, POE router, POE hub, or POE adapter. The Access Point will then power ON and connected to your existed wired LAN Network.

The Hardware Installation is complete.

Chapter 3 Wireless LAN Access Point Configuration

3.1 Getting Started

This Access Point provides web-based configuration tool allowing user to configure from wired or wireless stations. Follow the instructions below to get started configuration.

From Wired Station

1. Make sure user's wired station is in the same subnet with the Access Point.
   The default IP Address and Sub Mask of the Access Point is:
   Default IP Address: 192.168.2.1
   Default Subnet: 255.255.255.0

   Configure user's PC to be in the same subnet with the Access Point.

   1a) Windows 98SE/ME

   1. Click the *Start* button and select *Settings*, then click *Control Panel*. The *Control Panel* window will appear.
   2. Double-click *Network* icon. The *Network* window will appear.
   3. Check user's list of *Network Components*. If TCP/IP is not installed, click the *Add* button to install it now. If TCP/IP is installed, go to **step 6**.
   4. In the *Network Component Type* dialog box, select *Protocol* and click *Add* button.
   5. In the *Select Network Protocol* dialog box, select *Microsoft and TCP/IP* and then click the *OK* button to start installing the TCP/IP protocol. User may need user's Windows CD to complete the installation.
   6. After installing TCP/IP, go back to the *Network* dialog box. Select *TCP/IP* from the list of *Network Components* and then click the *Properties* button.
   7. Check each of the tabs and verify the following settings:
      - **Bindings**: Check *Client for Microsoft Networks* and *File and printer sharing for Microsoft Networks*.
      - **Gateway**: All fields are blank.
      - **DNS Configuration**: Select *Disable DNS.*
      - **WINS Configuration**: Select *Disable WINS Resolution.*

- **IP Address**: Select *Specify an IP Address.* Specify the IP Address and Subnet Mask as following example.
  - ✓ IP Address: 192.168.2.3 (any IP address within 192.168.2.2~192.168.2.254 is available, **do not setup 192.168.2.1**)
  - ✓ Subnet Mask: 255.255.255.0

8. Reboot the PC. User's PC will now have the IP Address user specified.

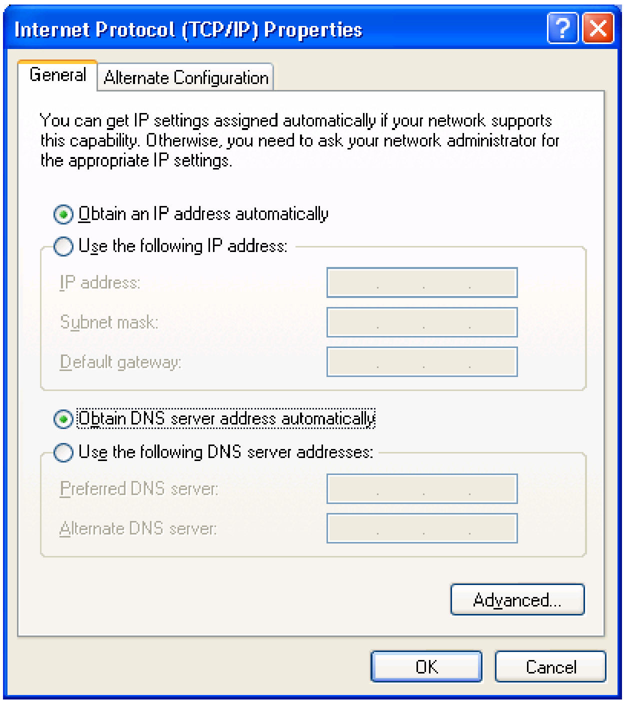
1b) Windows XP

1. Click the *Start* button and select *Settings*, then click *Network Connections.* The *Network Connections* window will appear.

2. Double-click *Local Area Connection* icon. The *Local Area Connection* window will appear.

3. Check user's list of Network Components. User should see *Internet Protocol [TCP/IP]* on user's list. Select it and click the *Properties* button.

4. In the Internet Protocol (TCP/IP) Properties window, select *Obtain an IP address automatically* and *Obtain DNS server address automatically* as shown on the following screen.



Internet Protocol (TCP/IP) Properties

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

● Obtain an IP address automatically
○ Use the following IP address:

IP address:
Subnet mask:
Default gateway:

● Obtain DNS server address automatically
○ Use the following DNS server addresses:

Preferred DNS server:
Alternate DNS server:

5. Click *OK* to confirm the setting. User's PC will now obtain an IP address automatically from user's Broadband Router's DHCP server.

Note: Please make sure that the Broadband router's DHCP server is the only DHCP server available on user's LAN.

Once user has configured user's PC to obtain an IP address automatically, please proceed to Step 3.

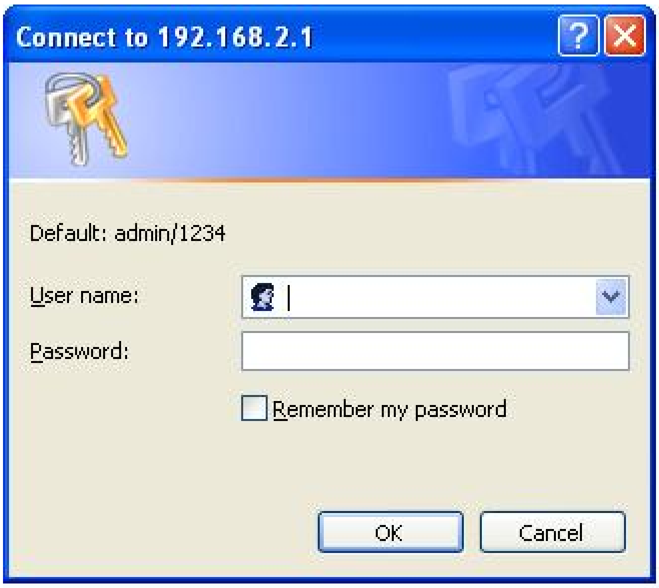
1c) Windows 2000

1. Click the *Start* button and select *Settings*, then click *Control Panel*. The *Control Panel* window will appear.
2. Double-click *Network and Dial-up Connections* icon. In the *Network and Dial-up Connection* window, double-click *Local Area Connection* icon. The *Local Area Connection* window will appear.
3. In the *Local Area Connection* window, click the *Properties* button.
4. Check user's list of *Network Components*. User should see *Internet Protocol [TCP/IP]* on user's list. Select it and click the *Properties* button.
5. In the *Internet Protocol (TCP/IP) Properties* window, select *Use the following IP address* and specify the IP Address and Subnet mask as following.
   - ✓ IP Address: 192.168.2.3 (any IP address within 192.168.2.2~192.168.2.254 is available, **do not setup 192.168.2.1**)
   - ✓ Subnet Mask: 255.255.255.0
6. Click *OK* to confirm the setting. User's PC will now have the IP Address user specified.

2. Enter **192.168.2.1** from Web Browser to get into the Access Point's configuration tool.
3. A screen will be popped up and request user to enter user name and password. The default user name and password is as follows.

   User Name: Admin
   Password: 1234

   Enter the default user name and password, then press **OK** button directly.



Connect to 192.168.2.1

Default: admin/1234

User name:

Password:

□ Remember my password

4. User can start configuring the Access Point.

From Wireless Station

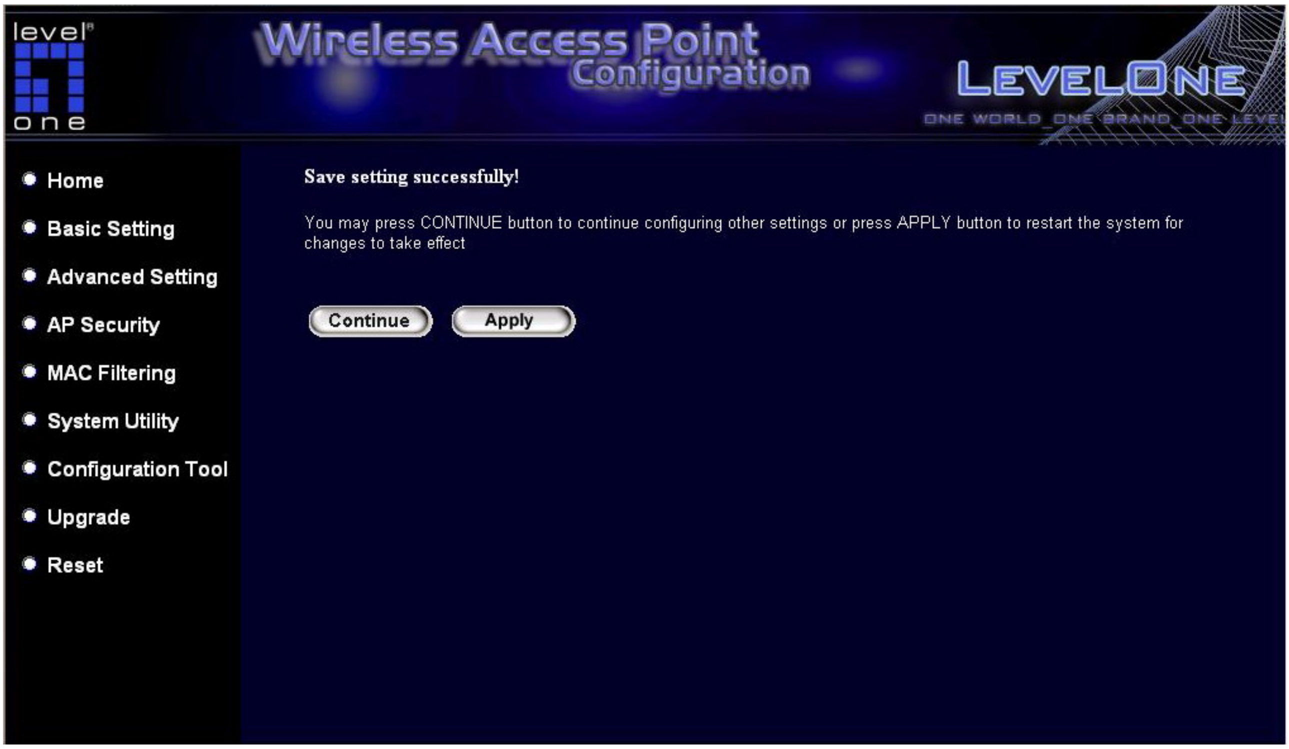
1. Make sure user's wireless station is in the same subnet with the Access Point. Please refer to the **step 1** above for configuring the IP Address and Sub Mask of the wireless station.

2. Connect to the Access Point. The Access Point's default ESSID is "**default**" and the WEP Encryption function is disabled. Make sure user's wireless station is using the same ESSID as the Access Point and associate user's wireless station to the Access Point.

3. Enter **192.168.2.1** from Web Browser to get into the Access Point's configuration tool.

4. Enter the user name and password and then press **OK** button and user are available to configure the Access Point now.

3.2 Configuring the Access Point



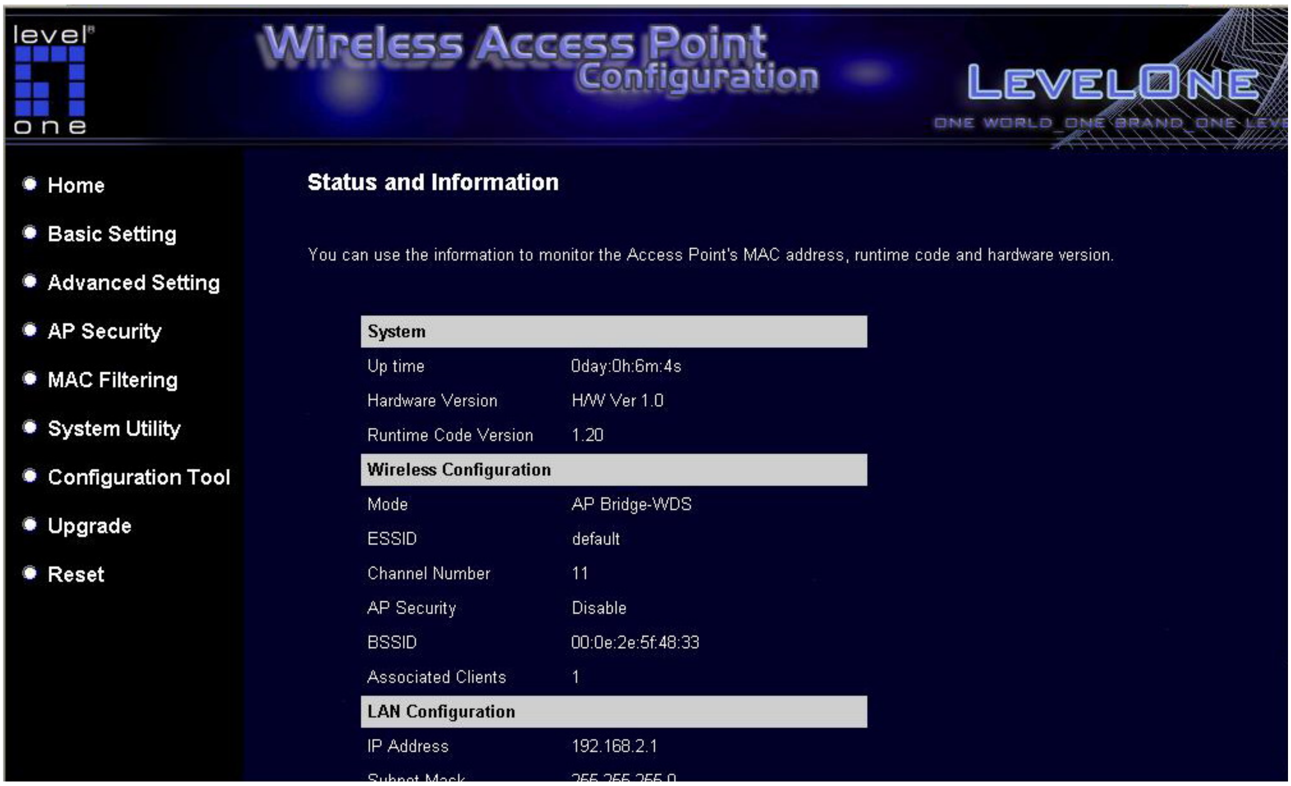
Save setting successfully!

You may press CONTINUE button to continue configuring other settings or press APPLY button to restart the system for changes to take effect

Every time when user has finished modifying a setting page and click “Apply” button, this page will pop-up. The settings have been successfully saved but will not take effect immediately. User has to restart the access point to make the new settings take effect. User can click “CONTINUE” button to continue other settings. User also can click “APPLY” to restart the system and make the settings take effect.

3.2.1 Status and Information

On this screen, user can see the general information of the Access Point including Alias Name, Firmware Version, ESSID, Channel Number, Status, IP Address, MAC Address, etc.



Status and Information

You can use the information to monitor the Access Point's MAC address, runtime code and hardware version.

System	
Up time	0day:0h:6m:4s
Hardware Version	H/W Ver 1.0
Runtime Code Version	1.20
Wireless Configuration	
Mode	AP Bridge-WDS
ESSID	default
Channel Number	11
AP Security	Disable
BSSID	00:0e:2e:5f:48:33
Associated Clients	1
LAN Configuration	
IP Address	192.168.2.1
Subnet Mask	255.255.255.0

3.2.2 Wireless Setting

This Access Point supports AP, Station, Bridge, WDS and Universal Repeater modes. “**AP Mode**” provides pure access point function. The simplest way to build up a wireless LAN is to use “AP Mode”.

“**Station Mode**” is used to let a network device with only wired Ethernet function to have wireless LAN communication capability. It provides both Ad Hoc and Infrastructure modes for the “Station Mode”. With **“Station-Ad Hoc mode**”, it can let user’s network device join a wireless LAN with peer-to-peer communication. With “**AP-Client mode**”, it can let user’s network device join a wireless LAN through an access point.

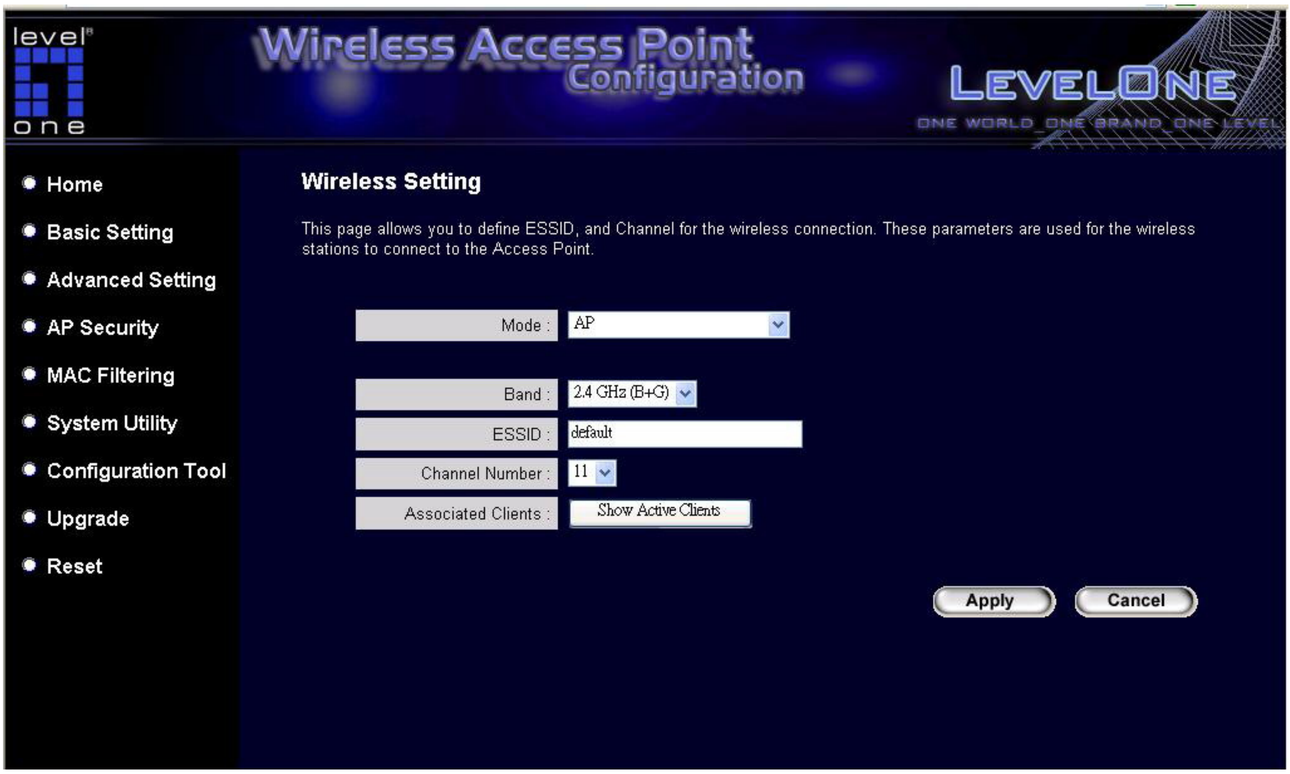
“**AP Bridge Mode**” provides the function to bridge more than two wired Ethernet networks together by wireless LAN. User can use two access points with “AP Bridge-Point to Point mode” to bridge two wired Ethernet networks together. If user want to bridge more than two wired Ethernet networks together, user have to use enough access points with “AP Bridge-Point to Multi-Point mode”.

An access point with “**AP Bridge-Point to Point mode**” or “**AP Bridge-Point to Multi-Point mode**” can only be used to bridge wired Ethernet networks together. It can’t accept connection from other wireless station at the same time. If user want an access point to bridge wired Ethernet network and provide connection service for other wireless station at the same time, user have to set the access point to “**AP Bridge-WDS mode**”.

Simply speaking, “AP Bridge-WDS mode” function is the combination of “AP mode” and “AP Bridge-Point to Multi-Point mode”. “

“**Universal Repeater Mode**” provides the function to act as AP client and AP at the same time. It can use AP client function to connect to a Root AP and use AP function to service all wireless stations within its coverage. All the stations within the coverage of this access point can be bridged to the Root AP. “Universal Repeater Mode” is very convenient to extend the coverage of user’s wireless network.

AP mode setting page:



Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

Mode : AP

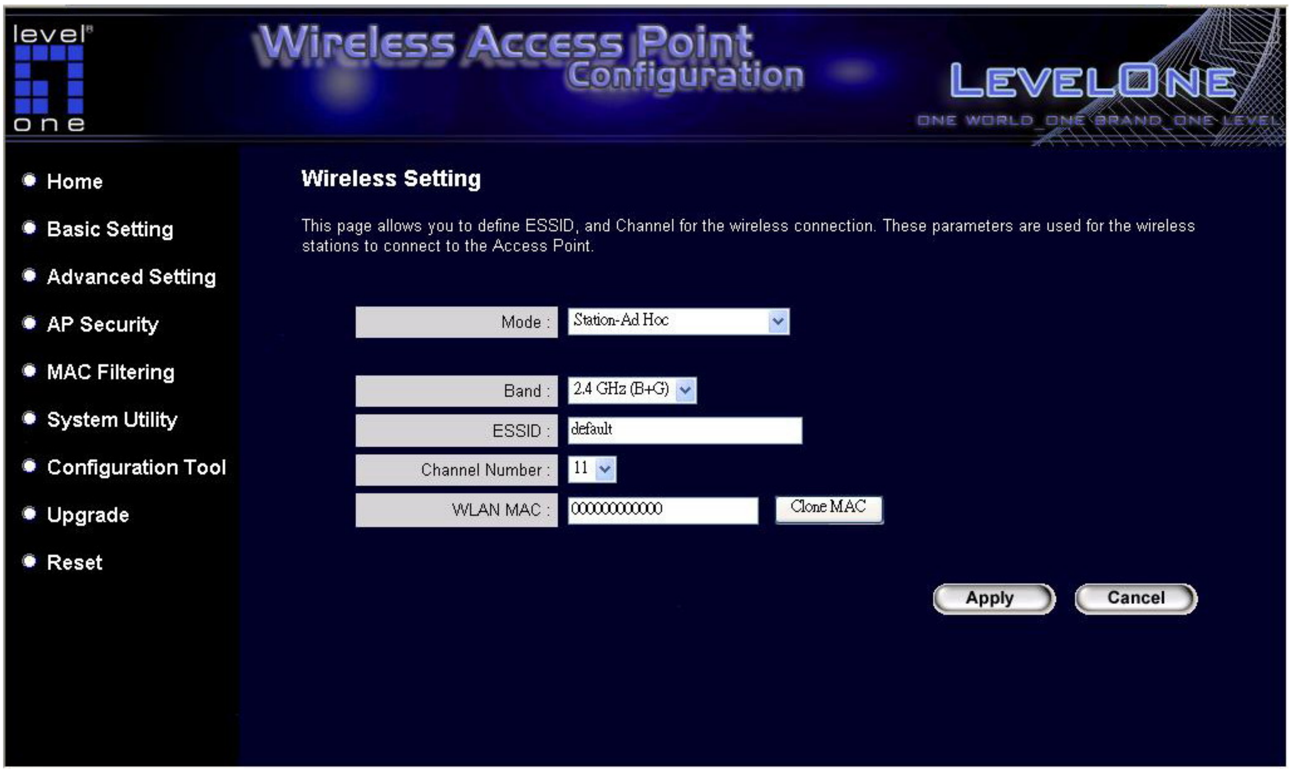
Band : 2.4 GHz (B+G)

ESSID : default

Channel Number : 11

Associated Clients : Show Active Clients

Station-Ad Hoc mode setting page:



Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

Mode : Station-Ad Hoc

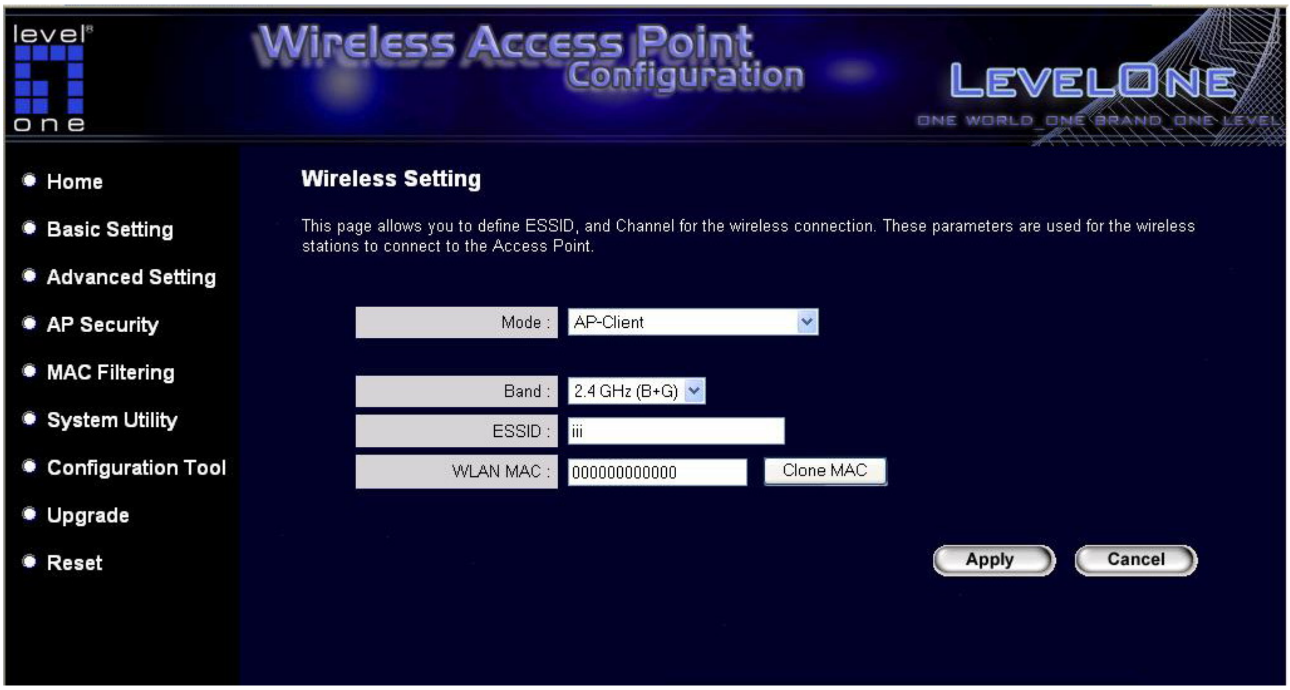
Band : 2.4 GHz (B+G)

ESSID : default

Channel Number : 11

WLAN MAC : 000000000000

AP-Client mode setting page:



Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

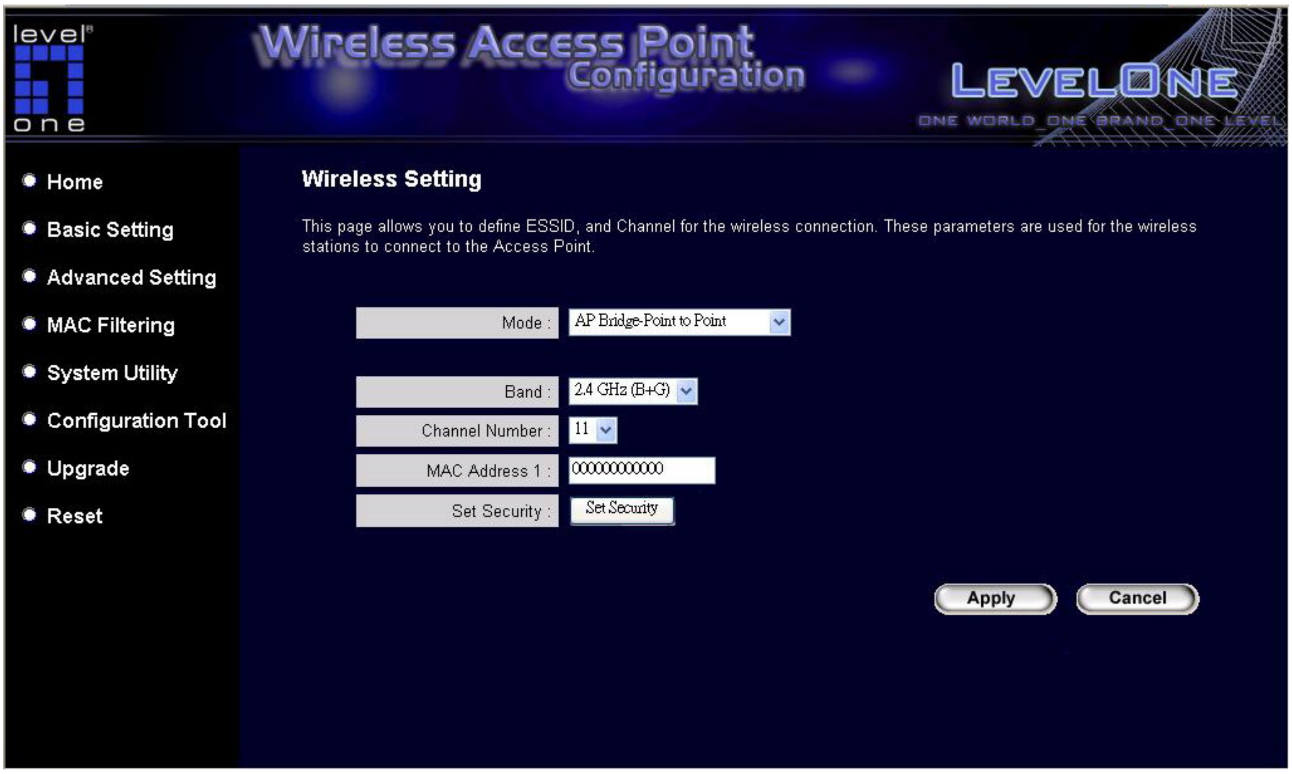
Mode : AP-Client

Band : 2.4 GHz (B+G)

ESSID : iii

WLAN MAC : 000000000000

AP Bridge-Point to Point mode setting page:



Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

Mode : AP Bridge-Point to Point

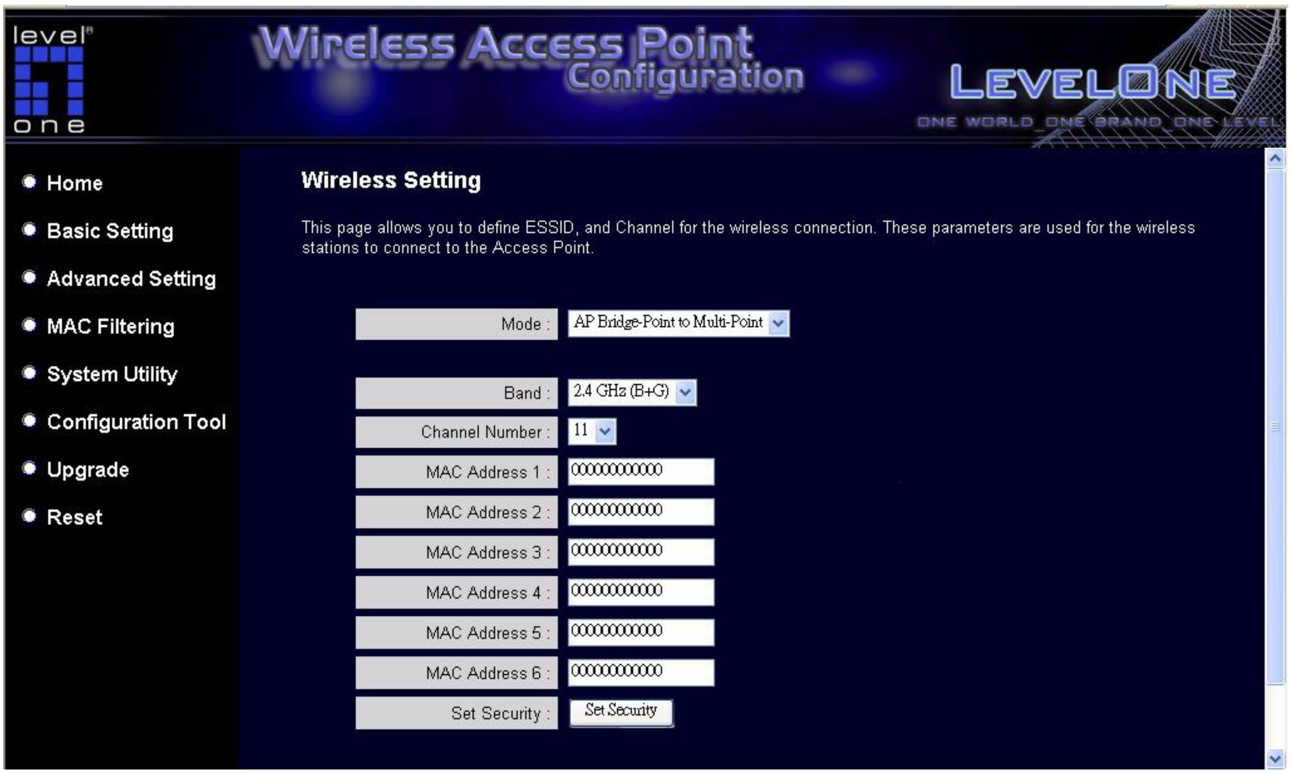
Band : 2.4 GHz (B+G)

Channel Number : 11

MAC Address 1 : 000000000000

Set Security :

Bridge-Point to Multi-Point mode setting page:

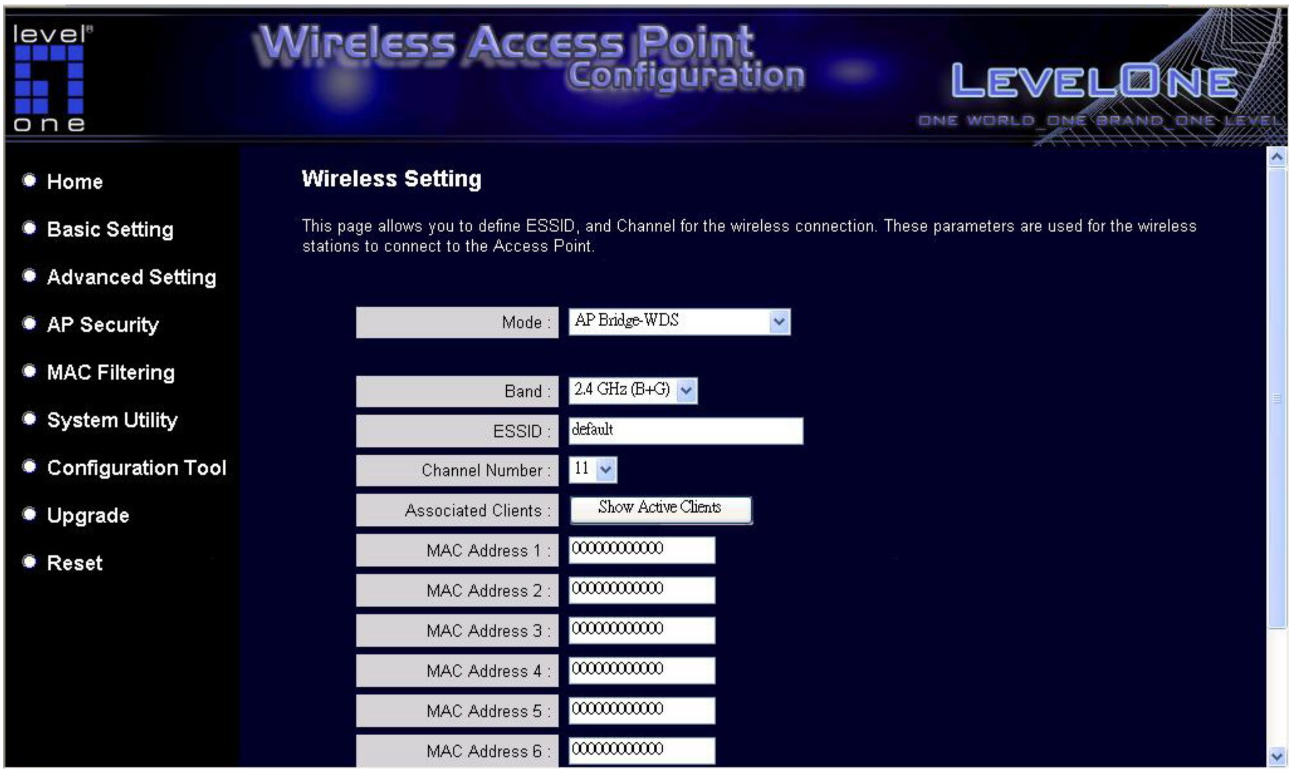


Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

Mode :	AP Bridge-Point to Multi-Point
Band :	2.4 GHz (B+G)
Channel Number :	11
MAC Address 1 :	000000000000
MAC Address 2 :	000000000000
MAC Address 3 :	000000000000
MAC Address 4 :	000000000000
MAC Address 5 :	000000000000
MAC Address 6 :	000000000000
Set Security :	Set Security

AP Bridge-WDS mode setting page:

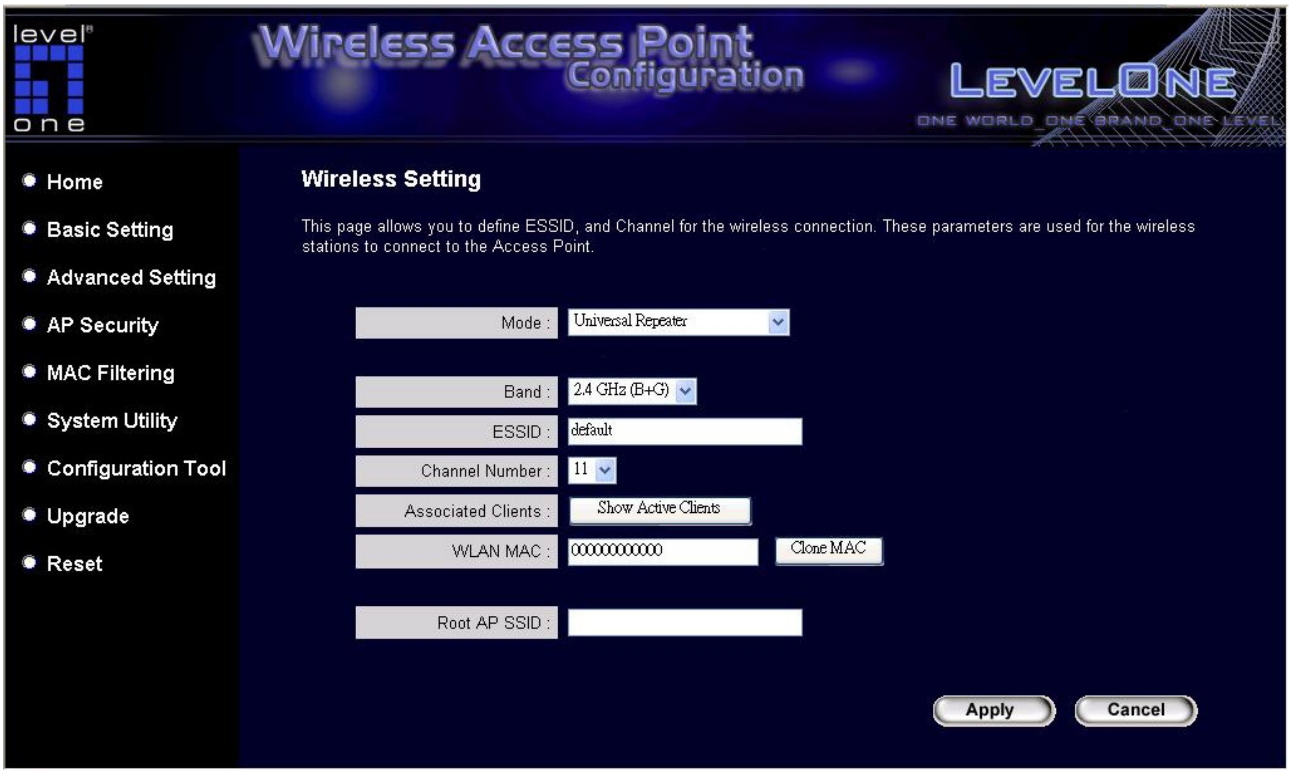


Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

Mode :	AP Bridge-WDS
Band :	2.4 GHz (B+G)
ESSID :	default
Channel Number :	11
Associated Clients :	Show Active Clients
MAC Address 1 :	000000000000
MAC Address 2 :	000000000000
MAC Address 3 :	000000000000
MAC Address 4 :	000000000000
MAC Address 5 :	000000000000
MAC Address 6 :	000000000000

Universal Repeater mode setting page:



Wireless Setting

This page allows you to define ESSID, and Channel for the wireless connection. These parameters are used for the wireless stations to connect to the Access Point.

Mode : Universal Repeater

Band : 2.4 GHz (B+G)

ESSID : default

Channel Number : 11

Associated Clients : Show Active Clients

WLAN MAC : 000000000000

Root AP SSID :

Parameter	Description
ESSID	The ESSID (up to 31 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs. Please make sure that the ESSID of all stations in the same WLAN network are the same. The default ESSID is "**default**". User should assign ESSID in "AP mode", "Station-Ad Hoc mode", "AP-Client mode", "AP Bridge-WDS mode" and "Universal Repeater mode".
Band	It allows user to set the AP fix at 802.11b or 802.11g modes. User also can select B+G mode to allow the AP select 802.11b and 802.11g connections automatically.
Channel Number	Select the appropriate channel from the list provided to correspond with user's network settings. Channels differ from country to country. Channel 1-11 (North America) Channel 1-14 (Japan) Channel 1-13 (Europe) There are 14 channels available. User should assign Channel Number in "AP mode", "Station-Ad Hoc

mode", "AP Bridge-Point to Point mode", "AP Bridge-Point to Multi-Point mode" and "AP Bridge-WDS mode", "Universal Repeater mode".

MAC Address

If user want to bridge more than one wired Ethernet networks together with wireless LAN, user have to set this access point to "AP Bridge-Point to Point mode", "AP Bridge-Point to Multi-Point mode" or "AP Bridge-WDS mode". User has to enter the MAC addresses of other access points that join the bridging work.

WLAN MAC

In "Station-Ad Hoc mode", "AP-Client mode" and "Universal Repeater mode", this device need a WLAN MAC address to act as a station to connect to other peer or access point. User also can click "Clone MAC" button to let this device copy the MAC address of the PC user are using to configure this device.

Root AP SSID

In "Universal Repeater mode", this device can act as a station to connect to a Root AP. User should assign the SSID of the Root AP here.

Note: Use "AP Security" for Universal Repeater encryption.

Set Security

In "AP Bridge-Point to Point mode", "AP Bridge-Point to Multi-Point mode" and "AP Bridge-WDS mode", user can click "Set Security" to add encryption for the communication between the bridged access points. This can protect user's wireless network.

Note: When using "AP Bridge-WDS mode", for Bridge encryption, click "Set Security", for WDS AP encryption, use "AP Security" for encryption setting.

Associated Clients

Click "Show Active Clients" button, then an "Active Wireless Client Table" will pop up. User can see the status of all active wireless stations that are connecting to the access point.

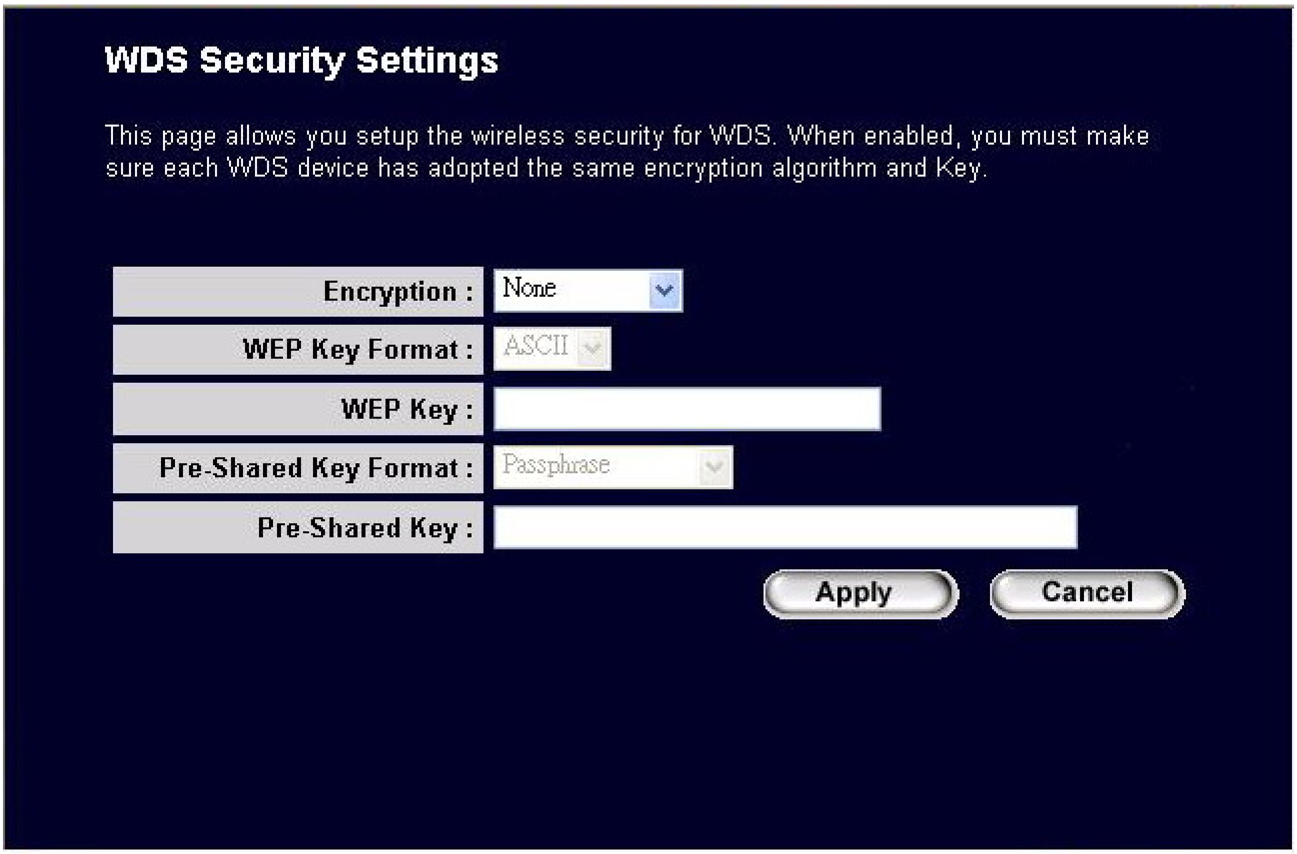
Wireless Site Survey

When use access point as a wireless station for wired network device to have wireless capability, user have to associate it will a working access point. Click "Select Site Survey" button, then a "Wireless Site Survey Table" will pop up. It will list all available access points near by. User can select one access point in the table and it will join wireless LAN through this access point.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

Set Security

“Set Security” let user setup the wireless security for the data transmission between the bridged access points in “AP Bridge-Point to Point mode”, “AP Bridge-Point to Multi-Point mode” or “AP Bridge-WDS mode”. It provides “WEP 64bits”, “WEP 128bits”, “WPA (TKIP)”, “WPA2 (AES)” encryption methods.



WDS Security Settings

This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.

Encryption :	None
WEP Key Format :	ASCII
WEP Key :	
Pre-Shared Key Format :	Passphrase
Pre-Shared Key :	

Parameter	Description
Encryption	User can select “No encryption”, “WEP 64bits”, “WEP 128bits”, “WPA (TKIP)” or “WPA2 (AES)” encryption methods.
Key Format	This is only used when user select “WEP 64bits” or “WEP 128bits” encryption method. User may select to select ASCII Characters (alphanumeric format) or Hexadecimal Digits (in the “A-F”, “a-f” and “0-9” range) to be the WEP Key. For example: ASCII Characters: guest Hexadecimal Digits: 12345abcde

WEP Key

This is only used when user select “WEP 64bits” or “WEP 128bits” encryption method. The WEP key is used to encrypt data transmitted between the bridged access points. Fill the text box by following the rules below.

64-bit WEP: input 10-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 5-digit ASCII character as the encryption keys.

128-bit WEP: input 26-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 10-digit ASCII characters as the encryption keys.

Pre-shared Key Format

User may select to select Passphrase (alphanumeric format) or Hexadecimal Digits (in the “A-F”, “a-f” and “0-9” range) to be the Pre-shared Key. For example:

Passphrase: iamguest

Hexadecimal Digits: 12345abcde

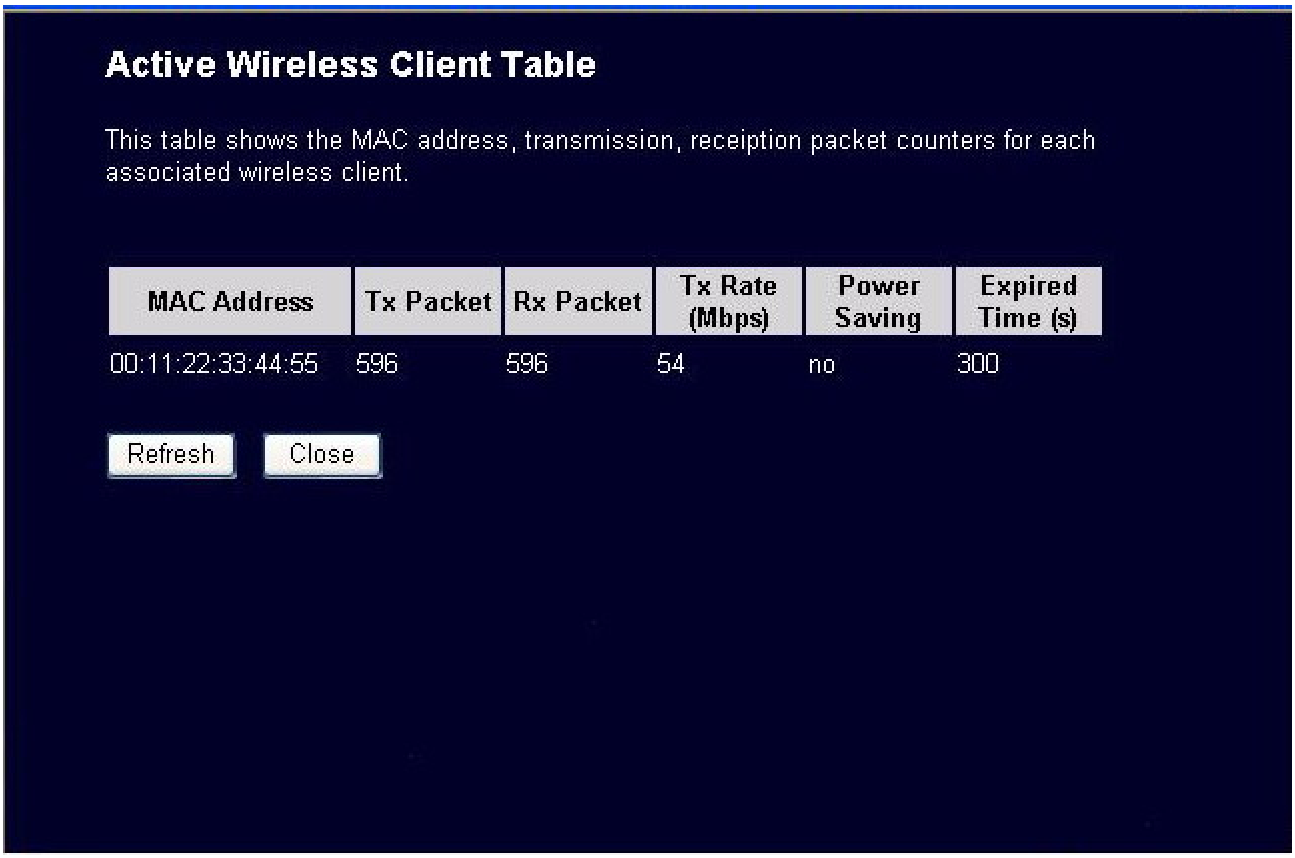
Pre-shared Key

The Pre-shared key is used to authenticate and encrypt data transmitted between the bridged access points. Fill the text box by following the rules below. Hex: input 64-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or at least 8 character pass phrase as the pre-shared keys.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

Active Wireless Client Table

“Active Wireless Client Table” records the status of all active wireless stations that are connecting to the access point. Users can lookup the MAC Address, Number of Transmitted Packets, Number of Received Packets and Encryption Status of each active wireless client in this table.



Active Wireless Client Table

This table shows the MAC address, transmission, receiption packet counters for each associated wireless client.

MAC Address	Tx Packet	Rx Packet	Tx Rate (Mbps)	Power Saving	Expired Time (s)
00:11:22:33:44:55	596	596	54	no	300

Parameter	Description
MAC Address	MAC address of this active wireless station.
Tx Packet	The number of transmitted packets that are sent out from this active wireless station.
Rx Packet	The number of received packets that are received by this active wireless station.
TX Rate	The transmission rate in Mbps.

Power Saving

Shows if the wireless client is in Power Saving mode.

Expired Time

The time in second before dissociation. If the wireless keeps idle long than the expired time, this access point will dissociate it. The wireless client station has to associate again when it becomes active.

Refresh

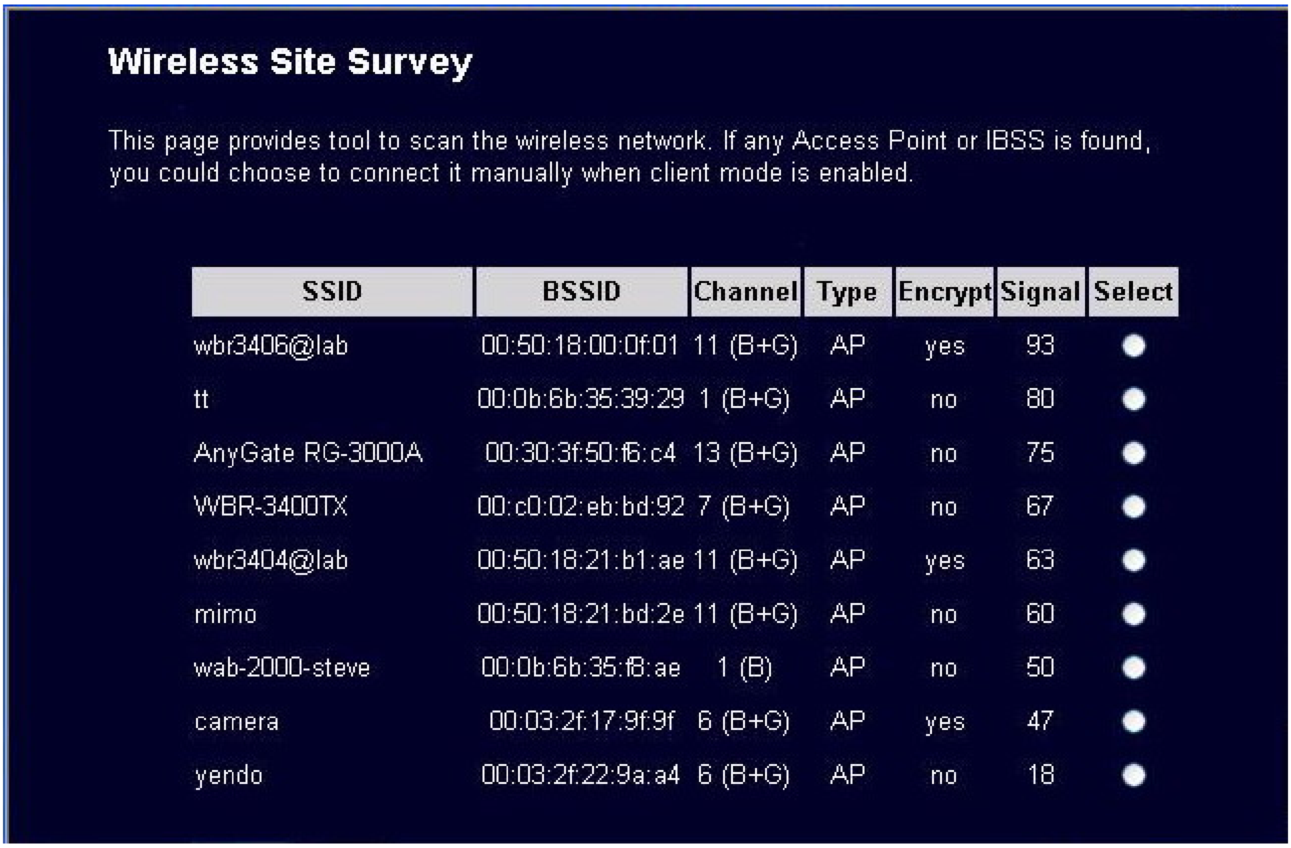
Refresh the “Active Wireless Client Table”.

Close

Refresh the “Active Wireless Client Table”.

Wireless Site Survey

When this access point is in “Station-Ad Hoc mode”, “AP-Client mode” or “Universal Repeater mode”, it should associate with an access point or station and connect to user’s wireless LAN through the associated access point or station. “Wireless Site Survey” searches for all available access points near by. User can select one access point listed in this table.



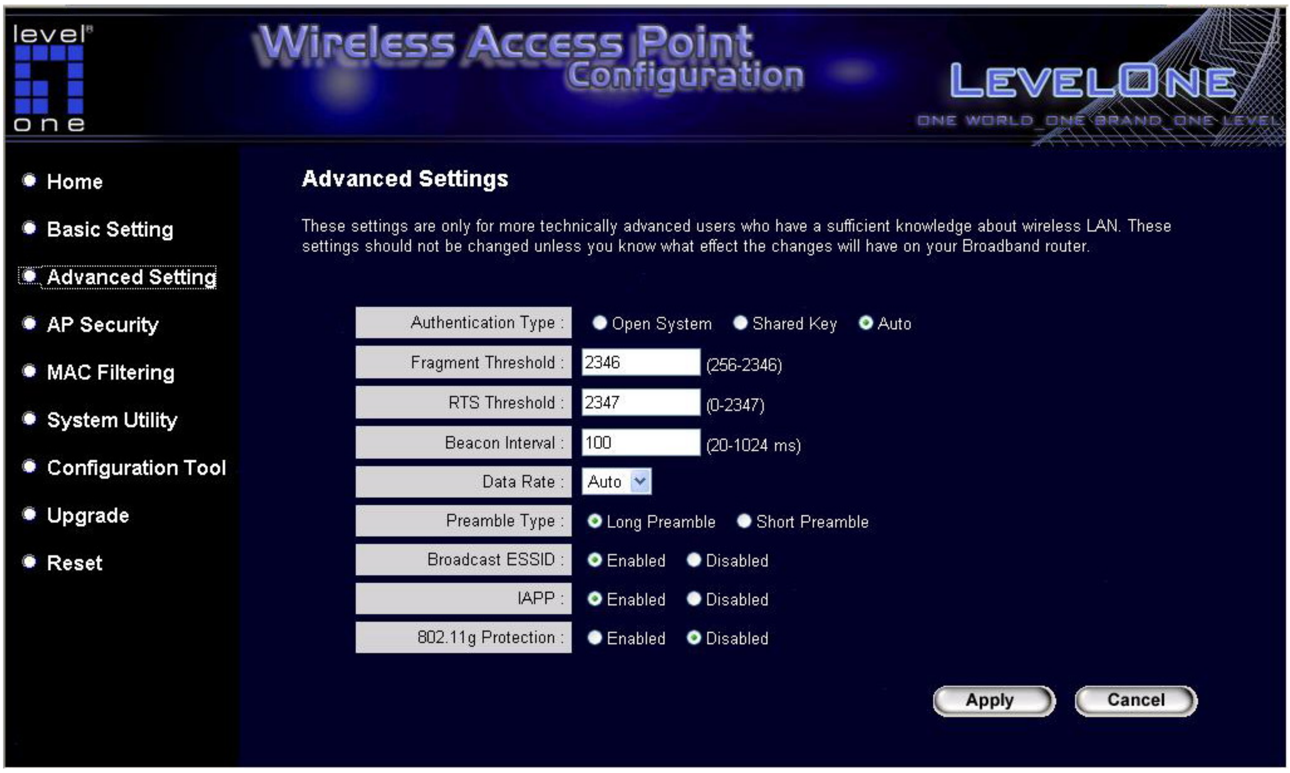
Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

SSID	BSSID	Channel	Type	Encrypt	Signal	Select
wbr3406@lab	00:50:18:00:0f:01	11 (B+G)	AP	yes	93	○
tt	00:0b:6b:35:39:29	1 (B+G)	AP	no	80	○
AnyGate RG-3000A	00:30:3f:50:f6:c4	13 (B+G)	AP	no	75	○
WBR-3400TX	00:c0:02:eb:bd:92	7 (B+G)	AP	no	67	○
wbr3404@lab	00:50:18:21:b1:ae	11 (B+G)	AP	yes	63	○
mimo	00:50:18:21:bd:2e	11 (B+G)	AP	no	60	○
wab-2000-steve	00:0b:6b:35:f8:ae	1 (B)	AP	no	50	○
camera	00:03:2f:17:9f:9f	6 (B+G)	AP	yes	47	○
yendo	00:03:2f:22:9a:a4	6 (B+G)	AP	no	18	○

3.2.3 Advanced Setting

User can set advanced parameters of this access point. The parameters include Authentication Type, Fragment Threshold, RTS Threshold, Beacon Interval, Tx Operation Rate, Tx Basic Rate, Preamble Type, Broadcast ESSID. User should not change these parameters unless user knows what effect the changes will have on this access point.



Advanced Settings

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your Broadband router.

Authentication Type :	○ Open System ○ Shared Key ● Auto
Fragment Threshold :	2346 (256-2346)
RTS Threshold :	2347 (0-2347)
Beacon Interval :	100 (20-1024 ms)
Data Rate :	Auto
Preamble Type :	● Long Preamble ○ Short Preamble
Broadcast ESSID :	● Enabled ○ Disabled
IAPP :	● Enabled ○ Disabled
802.11g Protection :	○ Enabled ● Disabled

Parameter	Description
Authentication Type	There are two authentication types: "Open System" and "Shared Key". When users select "Open System", wireless stations can associate with this access point without WEP encryption. When users select "Shared Key", user should also setup WEP key in the "Encryption" page and wireless stations should use WEP encryption in the authentication phase to associate with this access point. If users select "Auto", the wireless client can associate with this access point by using any one of these two authentication types.
Fragment Threshold	"Fragment Threshold" specifies the maximum size of packet during the fragmentation of data to be transmitted. If user set this value too low, it

will result in bad performance.

RTS Threshold

When the packet size is smaller than the RTS threshold, the access point will not use the RTS/CTS mechanism to send this packet.

Beacon Interval

The interval of time that this access point broadcast a beacon. Beacon is used to synchronize the wireless network.

Data Rate

The “Data Rate” is the rate this access point uses to transmit data packets. The access point will use the highest possible selected transmission rate to transmit the data packets.

Preamble Type

Preamble type defines the length of CRC block in the frames during the wireless communication. “Short Preamble” is suitable for high traffic wireless network. “Long Preamble” can provide more reliable communication.

Broadcast ESSID

If users enable “Broadcast ESSID”, every wireless station located within the coverage of this access point can discover this access point easily. If users are building a public wireless network, enabling this feature is recommended. Disabling “Broadcast ESSID” can provide better security.

IAPP

If users enable “IAPP”, the access point will automatically broadcast information of associated wireless stations to its neighbors. This will help wireless station roaming smoothly between access points. If users have more than one access points in user’s wireless LAN and wireless stations have roaming requirements, enabling this feature is recommended. Disabling “IAPP” can provide better security.

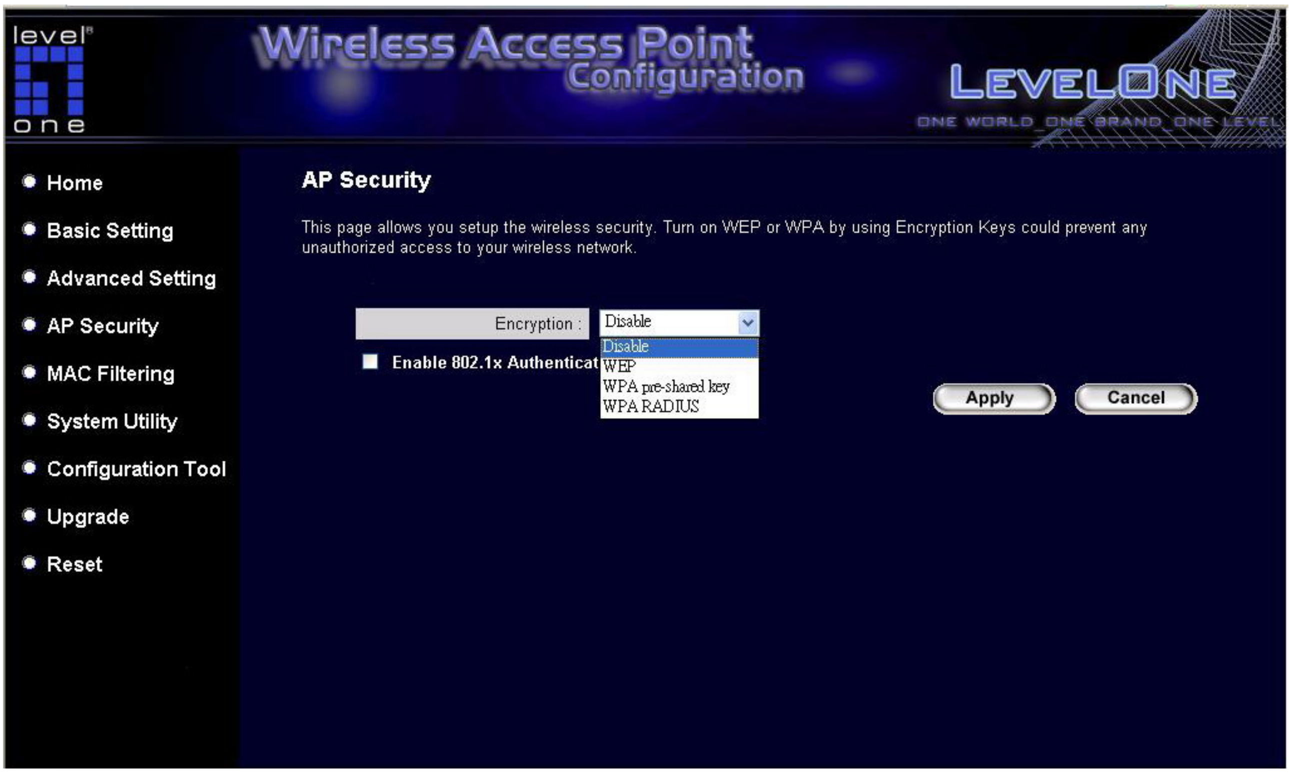
802.11g Protection

This is also called CTS Protection. It is recommended to enable the protection mechanism. This mechanism can decrease the rate of data collision between 802.11b and 802.11g wireless stations. When the protection mode is enabled, the throughput of the AP will be a little lower due to many of frame traffic should be transmitted.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

3.2.4 AP Security

This Access Point provides complete wireless LAN security functions; include WEP, IEEE 802.1x, IEEE 802.1x with WEP, WPA with pre-shared key and WPA with RADIUS. With these security functions, user can prevent user's wireless LAN from illegal access. Please make sure user's wireless stations use the same security function.



AP Security

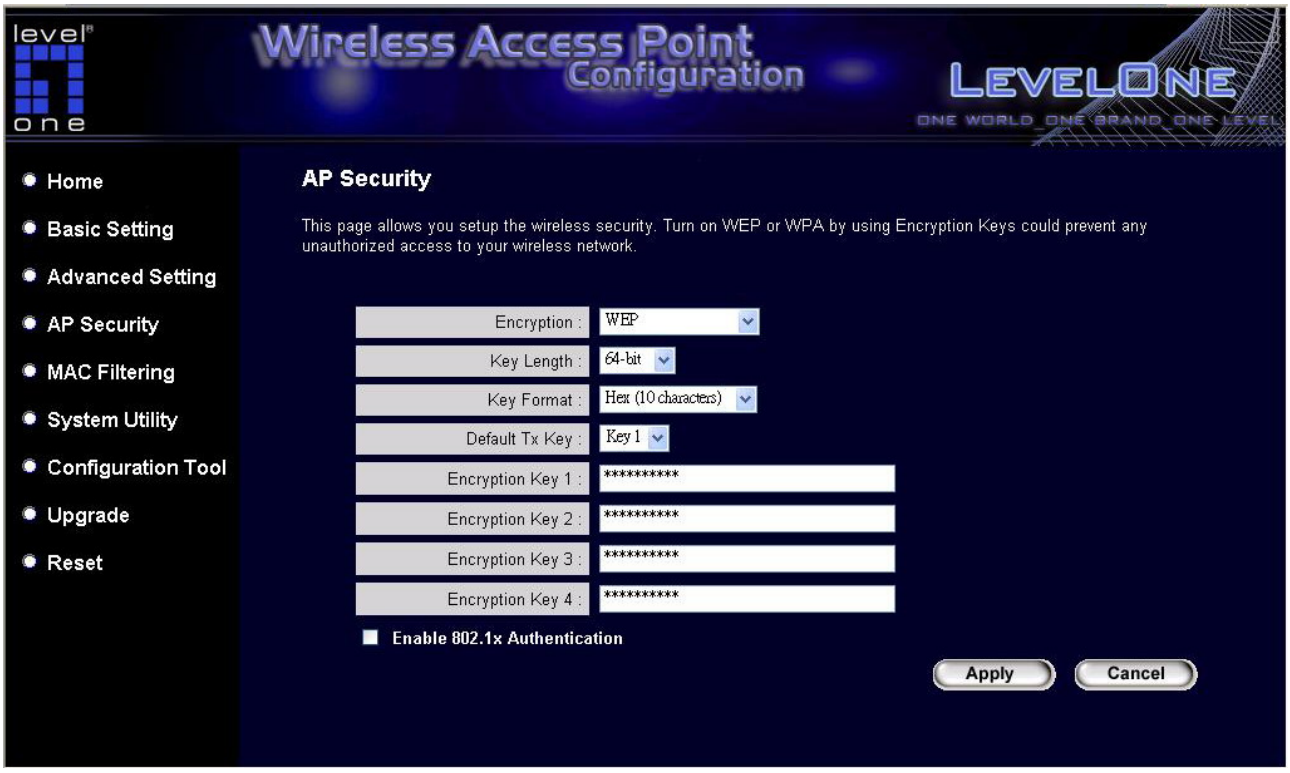
This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption : Disable

□ Enable 802.1x Authenticat

WEP only

When select 64-bit or128-bit WEP key, user must enter the encryption keys. User can generate the key by you and enter it. User can enter four WEP keys and select one of them as default key. Then the access point can receive any packets encrypted by one of the four keys. User can use WEP encryption in “AP mode”, “Station-Ad Hoc mode”, “AP-Client mode”, “AP Bridge-WDS mode” and “Universal Repeater mode”.



AP Security

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption :	WEP
Key Length :	64-bit
Key Format :	Hex (10 characters)
Default Tx Key :	Key 1
Encryption Key 1 :	**********
Encryption Key 2 :	**********
Encryption Key 3 :	**********
Encryption Key 4 :	**********

□ Enable 802.1x Authentication

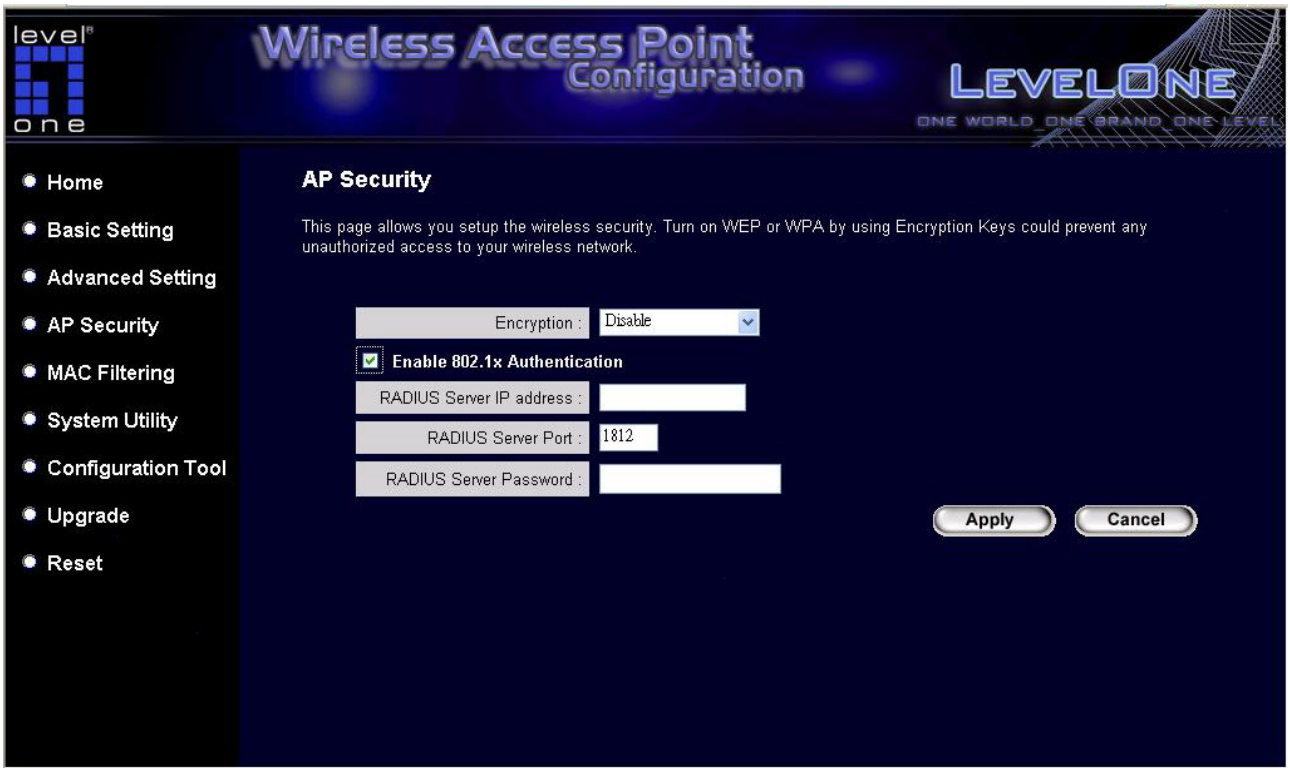
Parameter	Description
Key Length	User can select the 64 or 128-bit key to encrypt transmitted data. Larger WEP key length will provide higher level of security, but the throughput will be lower.
Key Format	User may select to select ASCII Characters (alphanumeric format) or Hexadecimal Digits (in the “A-F”, “a-f” and “0-9” range) to be the WEP Key. For example: ASCII Characters: guest Hexadecimal Digits: 12345abcde
Default Tx Key	Select one of the four keys to encrypt user’s data. Only the key user select it in the “Default key” will take effect.

Key 1 - Key 4	The WEP keys are used to encrypt data transmitted in the wireless network. Fill the text box by following the rules below. 64-bit WEP: input 10-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 5-digit ASCII character as the encryption keys. 128-bit WEP: input 26-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 10-digit ASCII characters as the encryption keys.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

802.1X ONLY

IEEE 802.1x is an authentication protocol. Every user must use a valid account to login to this Access Point before accessing the wireless LAN. The authentication is processed by a RADIUS server. This mode only authenticates user by IEEE 802.1x, but it does not encryption the data during communication. User can use 802.1x without encryption in "AP mode", "AP Bridge-WDS mode" and "Universal Repeater mode".



AP Security

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption : Disable

☑ Enable 802.1x Authentication

RADIUS Server IP address :

RADIUS Server Port : 1812

RADIUS Server Password :

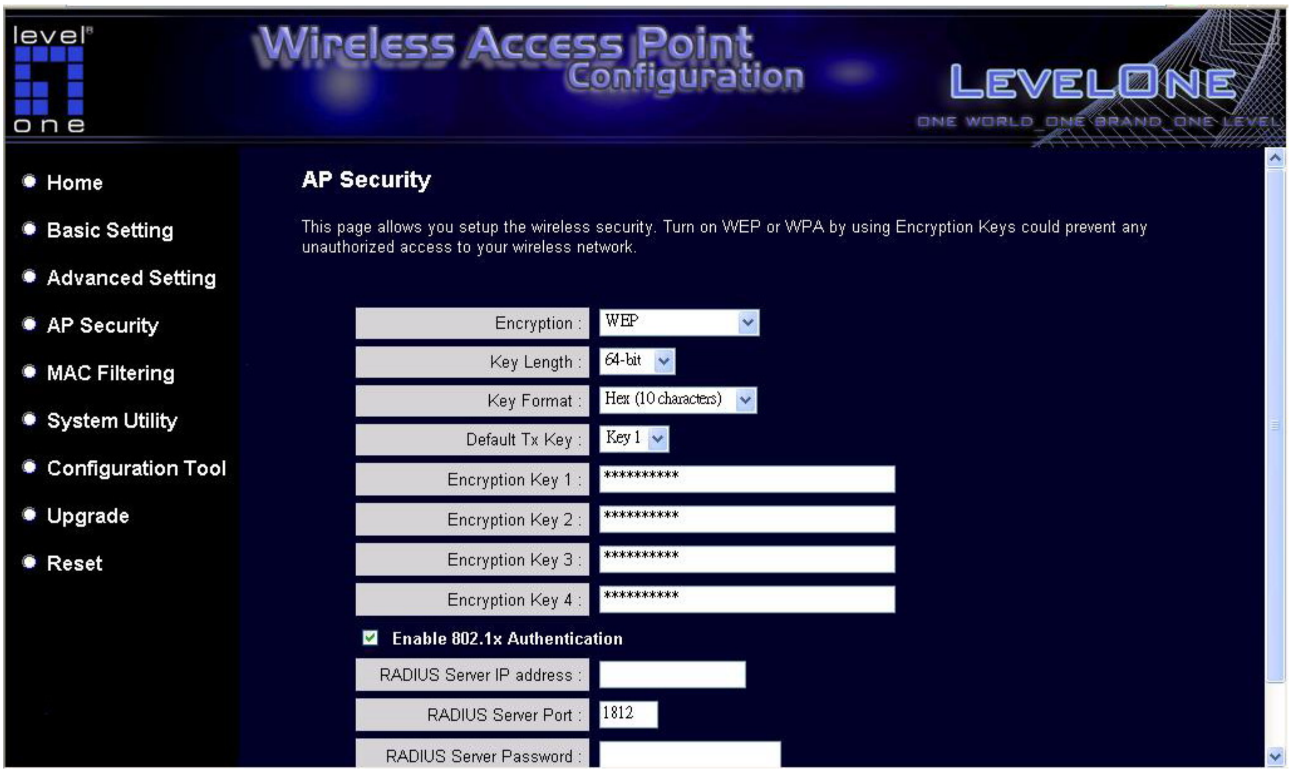
Parameter	Description
RADIUS Server IP address	The IP address of external RADIUS server.
RADIUS Server Port	The service port of the external RADIUS server.
RADIUS Server Password	The password used by external RADIUS server.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

802.1X WEP STATIC KEY

IEEE 802.1x is an authentication protocol. Every user must use a valid account to login to this Access Point before accessing the wireless LAN. The authentication is processed by a

RADIUS server. This mode also uses WEP to encrypt the data during communication. User can use 802.1x with WEP encryption in “AP mode”, “AP Bridge-WDS mode” and “Universal Repeater mode”.



AP Security

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption :	WEP
Key Length :	64-bit
Key Format :	Hex (10 characters)
Default Tx Key :	Key 1
Encryption Key 1 :	**********
Encryption Key 2 :	**********
Encryption Key 3 :	**********
Encryption Key 4 :	**********

☑ Enable 802.1x Authentication

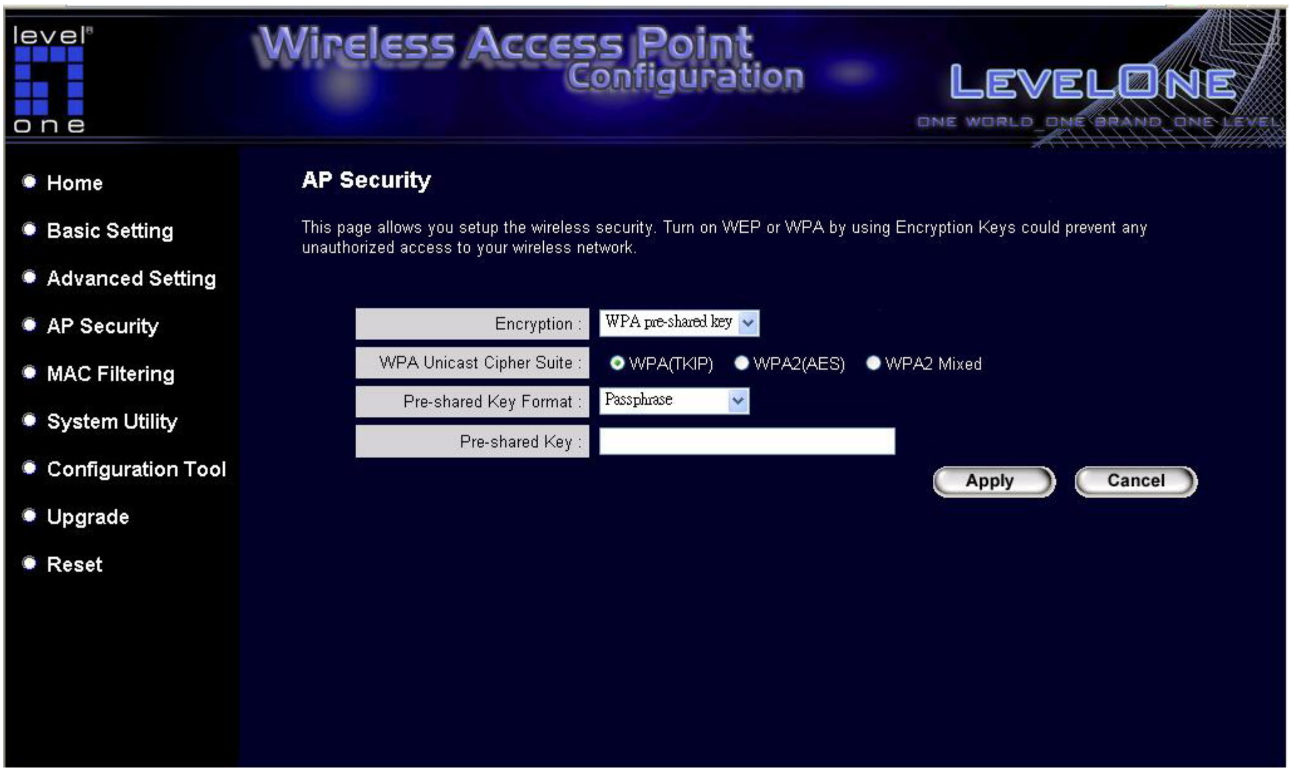
RADIUS Server IP address :	
RADIUS Server Port :	1812
RADIUS Server Password :	

For the WEP settings please refer to section “WEP only”. For the 802.1x settings, please refer to section “802.1x only”.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

WPA pre-shared key

Wi-Fi Protected Access (WPA) is an advanced security standard. User can use a pre-shared key to authenticate wireless stations and encrypt data during communication. It uses TKIP or CCMP(AES) to change the encryption key frequently. So the encryption key is not easy to be broken by hackers. This can improve security very much. User can use WPA pre-shared key encryption in "AP mode", "Station-Ad Hoc mode", "AP-Client mode", "AP Bridge-WDS mode" and "Universal Repeater mode".



AP Security

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption : WPA pre-shared key

WPA Unicast Cipher Suite : ● WPA(TKIP) ○ WPA2(AES) ○ WPA2 Mixed

Pre-shared Key Format : Passphrase

Pre-shared Key :

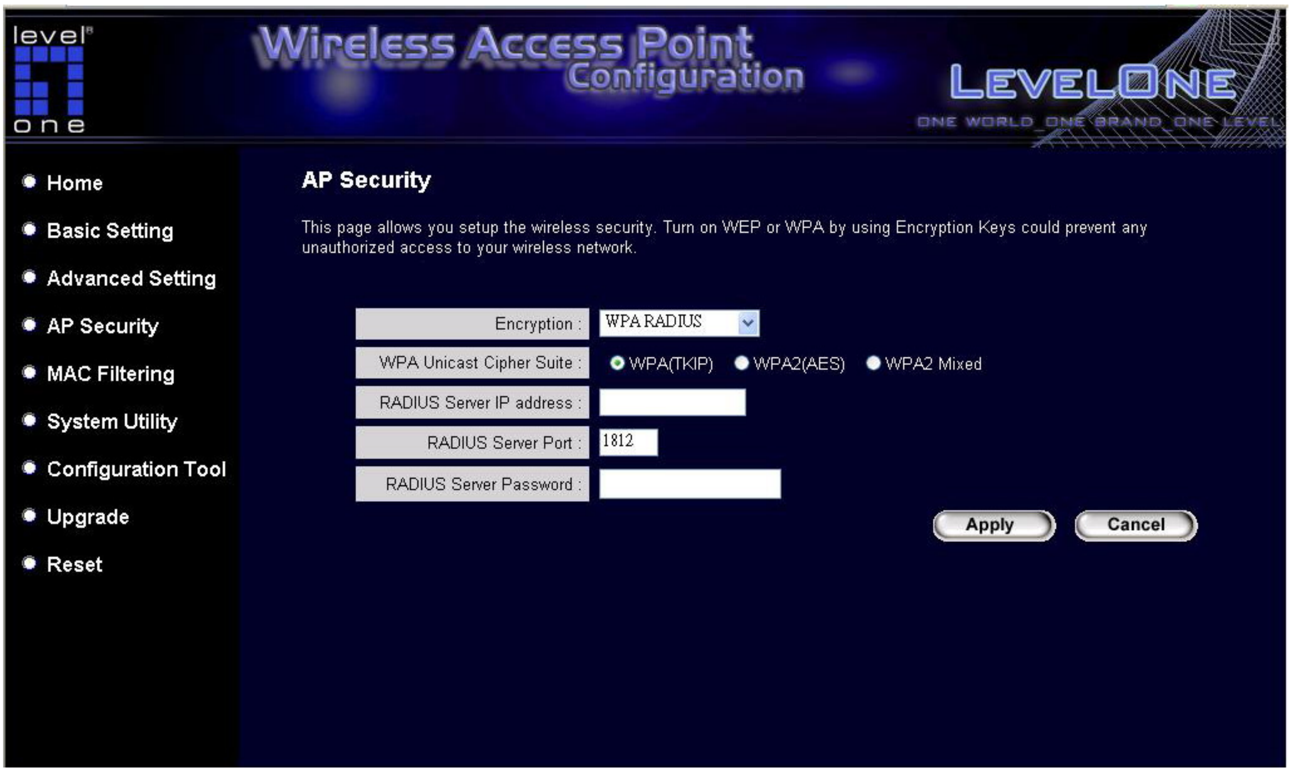
Parameter	Description
WPA (TKIP)	TKIP can change the encryption key frequently to enhance the wireless LAN security.
WPA2 (AES)	This use CCMP protocol to change encryption key frequently. AES can provide high level encryption to enhance the wireless LAN security.
WPA2 Mixed	This will use TKIP or AES based on the other communication peer automatically.
Pre-shared Key Format	User may select to select Passphrase (alphanumeric format) or Hexadecimal Digits (in the "A-F", "a-f" and "0-9" range) to be the Pre-

	shared Key. For example: Passphrase: iamguest Hexadecimal Digits: 12345abcde
Pre-shared Key	The Pre-shared key is used to authenticate and encrypt data transmitted in the wireless network. Fill the text box by following the rules below. Hex WEP: input 64-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or at least 8 character pass phrase as the pre-shared keys.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

WPA RADIUS

Wi-Fi Protected Access (WPA) is an advanced security standard. User can use an external RADIUS server to authenticate wireless stations and provide the session key to encrypt data during communication. It uses TKIP or CCMP(AES) to change the encryption key frequently. This can improve security very much. User can use WPA RADIUS encryption in "AP mode", "AP Bridge-WDS mode" and "Universal Repeater mode".



AP Security

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption : WPA RADIUS

WPA Unicast Cipher Suite : ● WPA(TKIP) ○ WPA2(AES) ○ WPA2 Mixed

RADIUS Server IP address :

RADIUS Server Port : 1812

RADIUS Server Password :

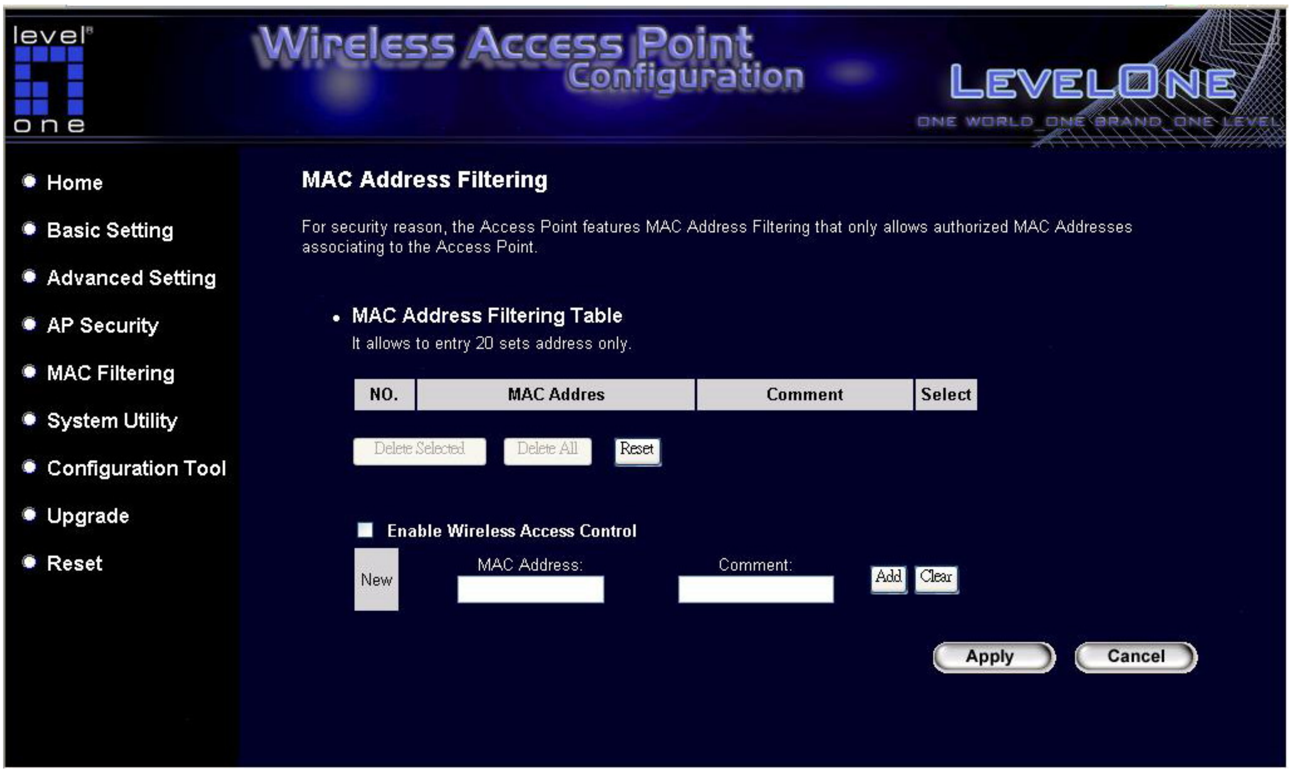
Parameter	Description
WPA(TKIP)	TKIP can change the encryption key frequently to enhance the wireless LAN security.
WPA2(AES)	This use CCMP protocol to change encryption key frequently. AES can provide high level encryption to enhance the wireless LAN security.
WPA2 Mixed	This will use TKIP or AES based on the other communication peer automatically.
RADIUS Server IP address	The IP address of external RADIUS server.
RADIUS Server Port	The service port of the external RADIUS server.

RADIUS Server Password	The password used by external RADIUS server.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

3.2.5 MAC Address Filtering

This Access Point provides MAC Address Filtering, which prevents the unauthorized MAC Addresses from accessing user’s wireless network.



MAC Address Filtering

For security reason, the Access Point features MAC Address Filtering that only allows authorized MAC Addresses associating to the Access Point.

- MAC Address Filtering Table

  It allows to entry 20 sets address only.

NO.	MAC Addres	Comment	Select

□ Enable Wireless Access Control

MAC Address:

Comment:

Parameter	Description
Enable Wireless Access Control	Enable or disable the MAC Address Filtering function.
MAC Address Filtering Table	This table records the MAC addresses of wireless stations user want to allow to access user’s network. The “Comment” field is the description of the wireless station associated with the “MAC Address” and is helpful for user to recognize the wireless station.
Add MAC address into the table	In the bottom “New” area, fill in the “MAC Address” and “Comment” of the wireless station to be added and then click “Add”. Then this wireless station will be added into the “MAC Address Filtering Table” above. If user find any typo before adding it and want to retype again. Just click “Clear” and both “MAC Address” and “Comment” fields will be cleared.

Remove MAC address from the table

If user wants to remove some MAC address from the “MAC Address Filtering Table”, select the MAC addresses user want to remove in the table and then click “Delete Selected”. If user want remove all MAC addresses from the table, just click “Delete All” button.

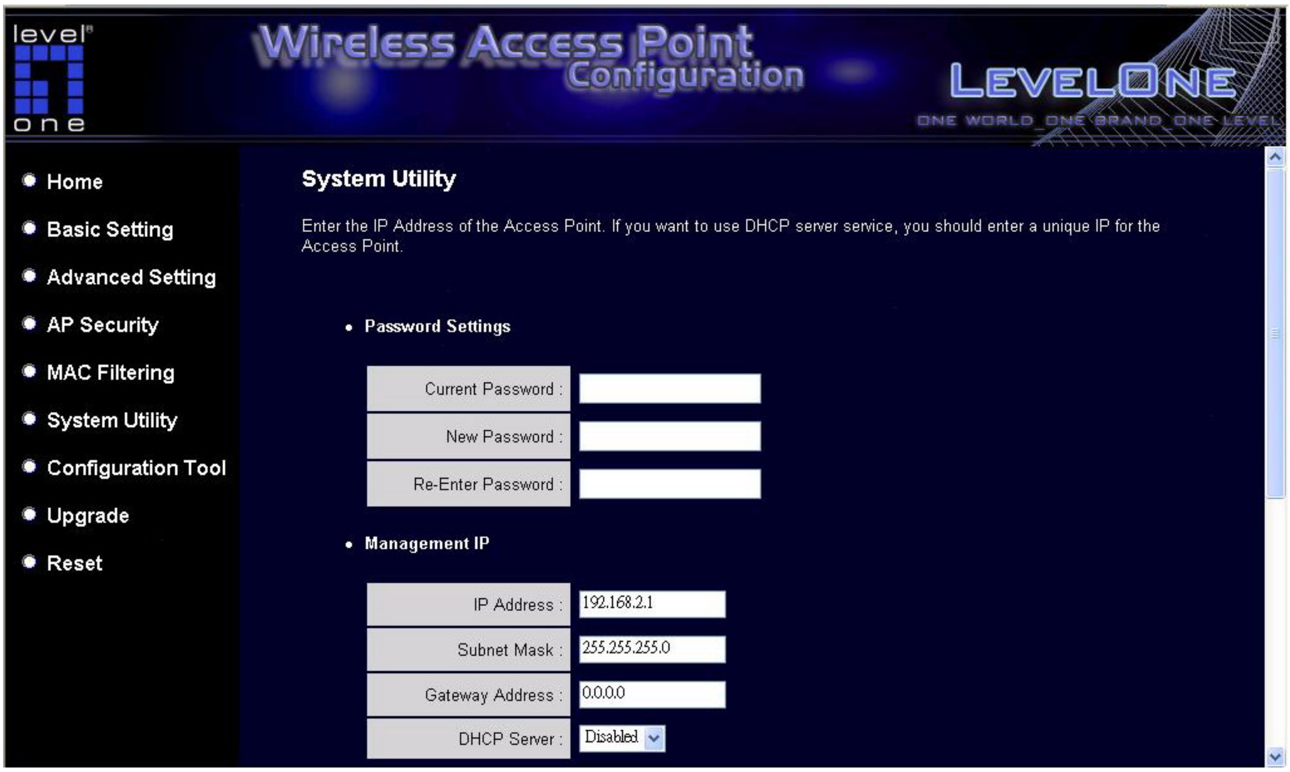
Reset

Click “Reset” will clear user’s current selections.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

3.2.6 System Utility

From here, user can define the Access Point's IP Address and Login Password and enable the Access Point to be a DHCP Server.



System Utility

Enter the IP Address of the Access Point. If you want to use DHCP server service, you should enter a unique IP for the Access Point.

- Password Settings

Current Password :	
New Password :	
Re-Enter Password :	

- Management IP

IP Address :	192.168.2.1
Subnet Mask :	255.255.255.0
Gateway Address :	0.0.0.0
DHCP Server :	Disabled

Parameter	Description
Current Password	Enter the current password (up to 15-digit alphanumeric string) of the Access Point. The default password for the Access Point is **1234**. Note that the password is case-sensitive.
New Password	Enter the password (up to 15-digit alphanumeric string) user want to login to the Access Point. Note that the password is case-sensitive.
Re-Enter Password	Reconfirm the password (up to 15-digit alphanumeric string) user want to login to the Access Point. Note that the password is case-sensitive.
IP Address	Designate the Access Point's IP Address. This IP Address should be unique in user's network. The default IP Address is **192.168.2.1**.

Subnet Mask

Specify a Subnet Mask for user’s LAN segment. The Subnet Mask of the Access Point is fixed and the value is **255.255.255.0**.

Gateway Address

The IP address of the default gateway of the subnet that this access point resides in. It allows this access point be accessed by PC from deferent subnet to do configuration.

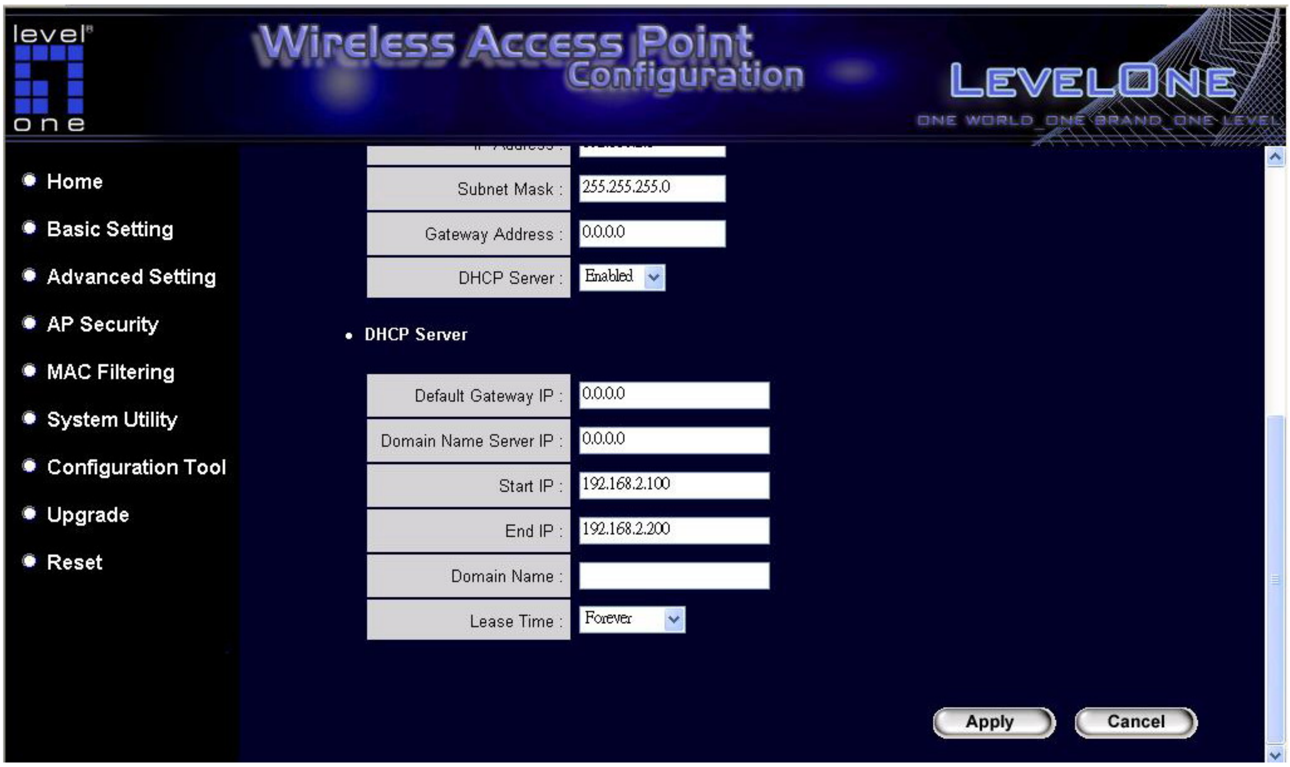
DHCP Server

Enable or disable the DHCP Server.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

DHCP Server Setting

DHCP Server will automatically give user's LAN client an IP address. If the DHCP is not enabled then user will have to manually set user's LAN client's IP address.



Subnet Mask :	255.255.255.0
Gateway Address :	0.0.0.0
DHCP Server :	Enabled

- DHCP Server

Default Gateway IP :	0.0.0.0
Domain Name Server IP :	0.0.0.0
Start IP :	192.168.2.100
End IP :	192.168.2.200
Domain Name :	
Lease Time :	Forever

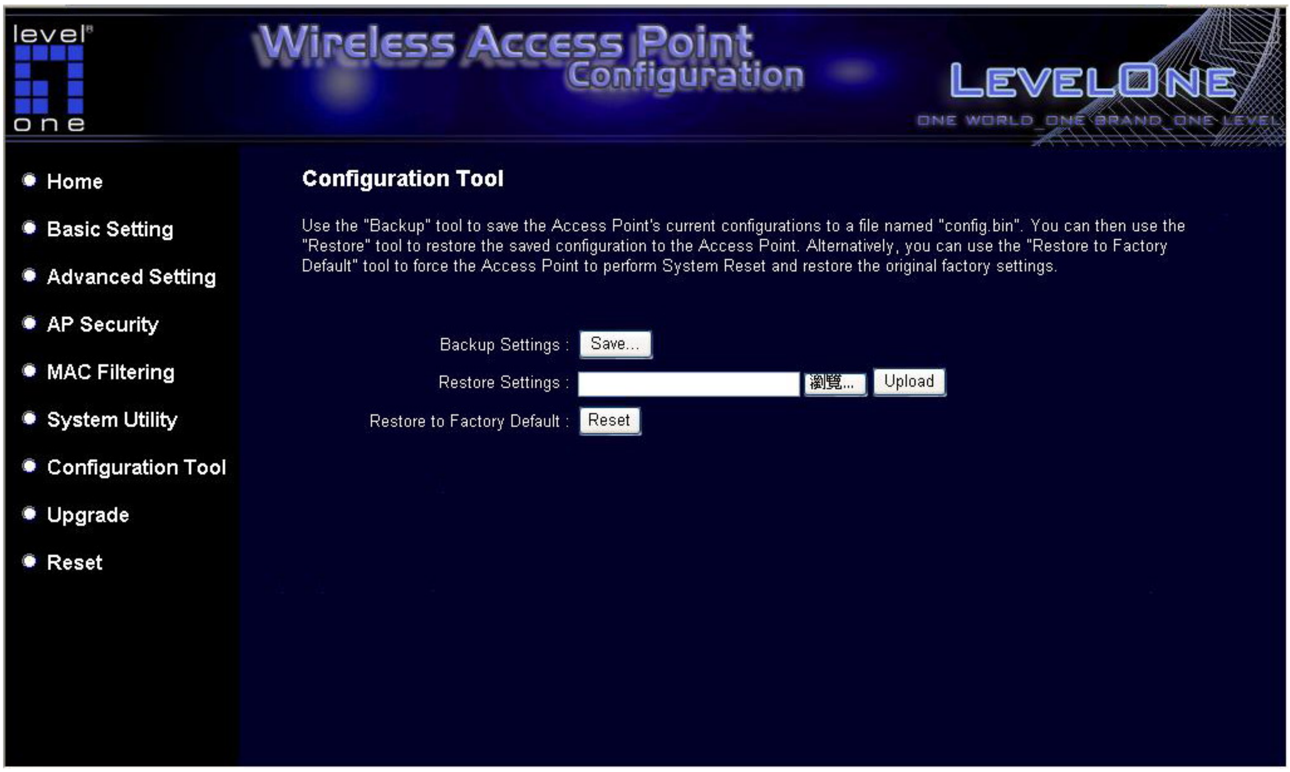
Parameter	Description
Default Gateway IP	Specify the gateway IP in user's network. This IP address should be different from the Management IP.
Domain Name Server IP	This is the ISP's DNS server IP address that they gave user; or user can specify user's own preferred DNS servers IP address.
Start IP/End IP	User can designate a particular IP address range for user's DHCP server to issue IP addresses to user's LAN Clients. By default the IP range is from: Start IP **192.168.2.100** to End IP **192.168.2.200**.
Domain Name	User can specify the Domain Name for user's Access Point.
Lease Time	The DHCP Server when enabled will temporarily give user's LAN client an IP address. In the Lease Time setting user can specify the time period that the

	DHCP Server lends an IP address to user’s LAN clients. The DHCP Server will change user’s LAN client’s IP address when this time threshold period is reached.

Click **Apply** button at the bottom of the screen to save the above configurations. User can now configure other advance sections or start using the Access Point.

3.2.7 Configuration Tool

The Configuration Tools screen allows user to save (**Backup**) the Access Point’s current configuration setting. Saving the configuration settings provides an added protection and convenience should problems occur with the Access Point and user have to reset to factory default. When user save the configuration setting (Backup) user can re-load the saved configuration into the Access Point through the **Restore** selection. If extreme problems occur user can use the **Restore to Factory Default** selection, this will set all configurations to its original default settings (e.g. when user first purchased the Access Point).



Configuration Tool

Use the "Backup" tool to save the Access Point's current configurations to a file named "config.bin". You can then use the "Restore" tool to restore the saved configuration to the Access Point. Alternatively, you can use the "Restore to Factory Default" tool to force the Access Point to perform System Reset and restore the original factory settings.

Backup Settings : Save...

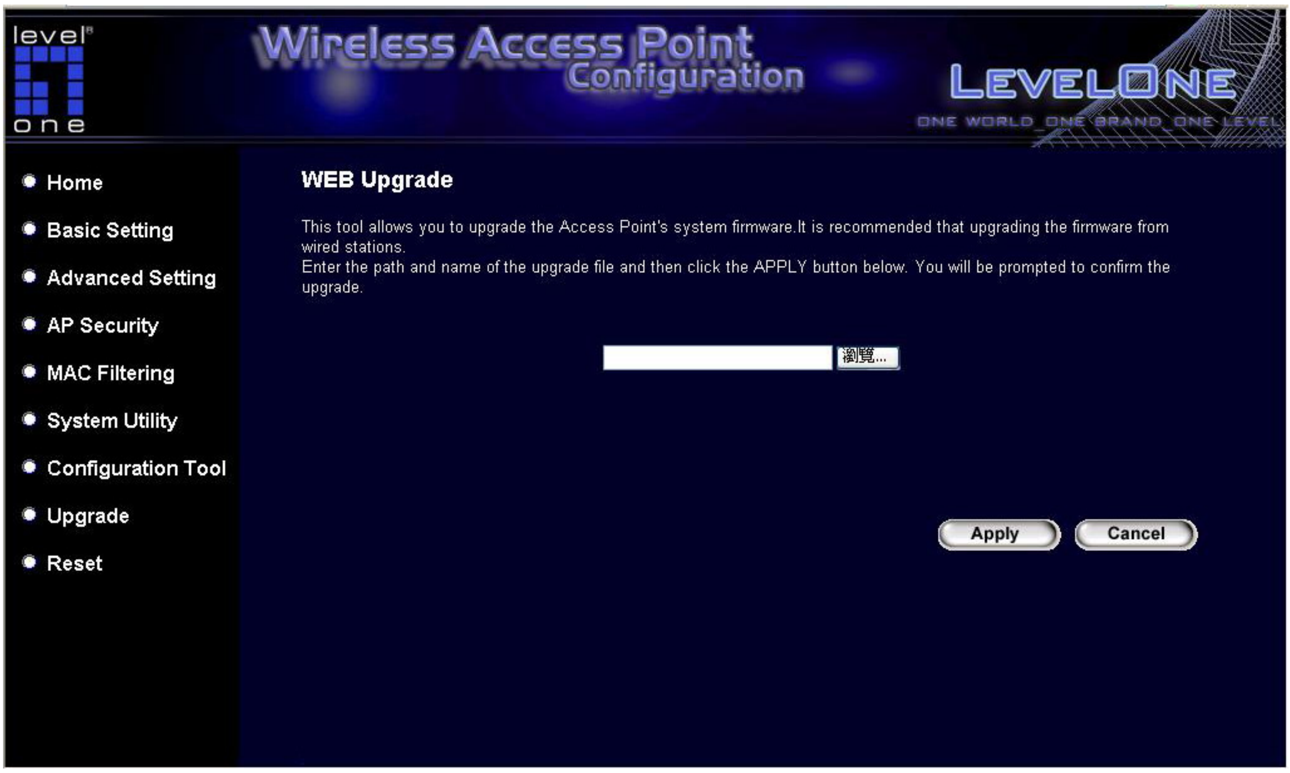
Restore Settings : 瀏覽... Upload

Restore to Factory Default : Reset

Parameter	Description
Configuration Tools	Use the "**Backup**" tool to save the Access Point’s current configuration to a file named "config.bin" on user’s PC. User can then use the "**Restore**" tool to upload and restore the saved configuration to the Access Point. Alternatively, user can use the "**Restore to Factory Default**" tool to force the Access Point to perform a power reset and restore the original factory settings.

3.2.8 Firmware Upgrade

This page allows user to upgrade the Access Point's firmware.



WEB Upgrade

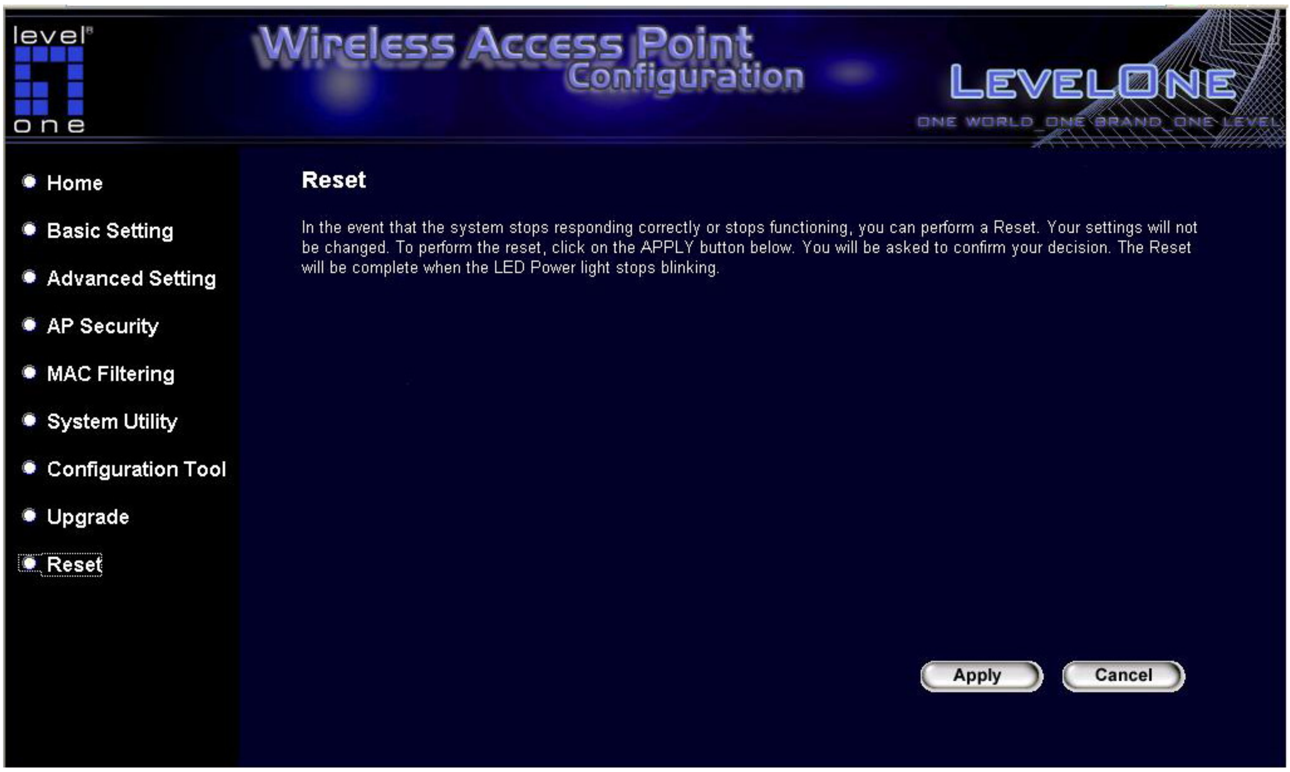
This tool allows you to upgrade the Access Point's system firmware.It is recommended that upgrading the firmware from wired stations.
Enter the path and name of the upgrade file and then click the APPLY button below. You will be prompted to confirm the upgrade.

Parameter	Description
Firmware Upgrade	This tool allows user to upgrade the Access Point's system firmware. To upgrade the firmware of user's Access Point, user need to download the firmware file to user's local hard disk, and enter that file name and path in the appropriate field on this page. User can also use the **Browse** button to find the firmware file on user's PC. Please reset the Access Point when the upgrade process is complete.

Once user has selected the new firmware file, click **Apply** button at the bottom of the screen to start the upgrade process. (User may have to wait a few minutes for the upgrade to complete). Once the upgrade is complete user can start using the Access Point.

3.2.9 Reset

User can reset the Access Point's system should any problem exist. The reset function essentially Re-boots user's Access Point's system.



Reset

In the event that the system stops responding correctly or stops functioning, you can perform a Reset. Your settings will not be changed. To perform the reset, click on the APPLY button below. You will be asked to confirm your decision. The Reset will be complete when the LED Power light stops blinking.

Parameter	Description
Reset	In the event that the system stops responding correctly or in some way stops functioning, user can perform a reset. **User's settings will not be changed**. To perform the reset, click on the **Apply** button. User will be asked to confirm user's decision. Once the reset process is complete user may start using the Access Point again.

Chapter 4 Troubleshooting

This chapter provides solutions to problems usually encountered during the installation and operation of the Access Point.

1. How to manually find user's PC's IP and MAC Address?

1) In Windows, open the Command Prompt program

2) Type **Ipconfig /all** and **Enter**

- User's PC's IP address is the one entitled **IP address**
- User's PC's MAC Address is the one entitled **Physical Address**

2. What is Ad-hoc?

An Ad-hoc wireless LAN is a group of computers, each with a WLAN adapter, connected as an independent wireless LAN.

3. What is Infrastructure?

An integrated wireless and wired LAN is called an Infrastructure configuration.

4. What is BSS ID?

A group of wireless stations and an Access Point compose a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSSID.

5. What is ESSID?

An Infrastructure configuration could also support roaming capability for mobile workers. More than one BSS can be configured as an Extended Service Set (ESS). Users within an ESS could roam freely between BSSs while maintaining a continuous connection to the wireless network stations and the Wireless LAN Access Points.

6. Can data be intercepted while transmitting through the air?

WLAN features two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent scrambling security feature. On the software side, the WLAN series offers the encryption function (WEP) to enhance security and access control.

7. What is WEP?

WEP stands for Wired Equivalent Privacy, a data privacy mechanism based on a 64(40)-bit shared key algorithm.

8. What is WPA?

WPA is an acronym for Wi-Fi Protected Access. It is a security protocol for 802.11 wireless networks. WPA can provide data protection with the use of encryption and the use of access controls and user authentication.

9. What is WPA2?

In addition to WPA, WPA2 provides a stronger encryption mechanism through Advanced Encryption Standard (AES).

10. What is a MAC Address?

The Media Access Control (MAC) address is a unique number assigned by the manufacturer to any Ethernet networking device, such as a network adapter, that allows the network to identify it at the hardware level. For all practical purposes, this number is usually permanent. Unlike IP addresses, which can change every time a computer logs on to the network, the MAC address of a device stays the same, making it a valuable identifier for the network.

CE Marking Warning

Hereby, Digital Data Communications, declares that this (Model-no. WAP-0006/0009) is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The CE-Declaration of Conformity can be downloaded at:

http://www.levelone.eu/support.php